

COMMON FLESHY FUNGI

by

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INTRODUCTION

These keys are designed primarily for beginners. For this reason technical terms have been avoided where a common word would serve the purpose, and most of the characters used to separate or identify different groups have been plainly diagrammed. No microscopic characters have been included, and while this sacrifices some accuracy, this sacrifice is felt to be justified by increased useability of the keys in the field.

Almost 250 species of common gilled fungi are included, and nearly 150 species of other fleshy fungi. Very few species are included that have not been studied first hand, and in many cases literally hundreds of specimens, collected in different years and at different places, have been worked over, so that where the present keys deviate from certain previous ones the deviation is not necessarily to be ascribed to carelessness or lack of critical study. Naturally, the writer has used many authoritative reference works on the different groups of fungi, and some of the most useful of these are cited in the Bibliography on page 231.

HOW TO USE THE KEYS

To illustrate the method of using the keys, suppose you find a gill fungus and want to identify it. To find out what group to start off with, turn to the plates on pages 1 to 7. There you see that fungi with gills are taken up on page 9. On page 9 you find that mushrooms with gills are divided into groups according to the color of spores produced.

To make a spore print, remove the cap of the mushroom, or a portion of the cap, and place it on a piece of paper, or better still, on a glass slide or other piece of glass. If the air is dry, cover the cap with a piece of moist paper toweling, and leave it for several hours, by which time usually sufficient spores will have fallen to make a visible print. The virtue of using glass instead of paper is that the glass can be held against a light or dark background and the color of the spores determined more easily. Incidentally, if the spore print is made on a glass microscope slide, it can be kept in a slide box - no covering or coating is necessary to preserve the print in this way, and such prints can be kept for many years, and often serve as a useful reference.

Often mushrooms will have deposited spores on grass, leaves, or the tops of other mushrooms growing beneath them, and will thus have obviated the need for making a spore print. While the making of a spore print entails a certain amount of bother and time, it often is essential for the identification of gill fungi and is useful in the identification of some other fungi.

The spores of the mushroom you found turn out to be purple-brown, and so you start off with the section Purple Brown Spored Mushrooms. There are 2 possibilities given in the key, as follows:

1. Ring present on the stem - - 2
Ring absent - - 3

The mushroom has a fairly conspicuous ring on the stem, so you go to number 2, which also gives 2 possibilities, as follows:

2. Gills free - - Agaricus

Gills attached to the stem - - Stropharia

The various types of gills are illustrated in Plate 6, and there you find that "free" gills are those which do not touch the stem. The gills on this specimen definitely are free from the stem, and so the plant unquestionably is Agaricus. To determine the species, turn to the section where the purple-brown spored genera are taken up in detail, and there under the Key to the Genus Agaricus go through the same steps you went through above.

EDIBLE AND POISONOUS MUSHROOMS

There is no general "rule" or test by which one can determine whether a given mushroom is edible or poisonous. If one intends to eat wild mushrooms, the only safe procedure is to learn to recognize with absolute certainty some of the common, easily identified and almost unmistakable kinds, and to eat only those. Several of the books cited in the Bibliography on page 231 include detailed descriptions of a number of common mushrooms. "Mushroom Collecting for Beginners" by J. Walton Groves, is an excellent and well illustrated bulletin available on request, without cost, from the Division of Botany, Department of Agriculture, Ottawa, Canada. In addition, books such as "Common Edible Mushrooms", for sale by the University of Minnesota Press, Minneapolis 14, Minnesota, and "Mushrooms and Toadstools" for sale by the Canadian Department of Agriculture at the address given above, will be found useful to those interested in edible wild fungi. Books and bulletins dealing with various groups of the fleshy fungi are listed under the various groups, and also are listed in the Bibliography on page 231.

AGARICACEAE
GILLED MUSHROOMS

(see page 9)

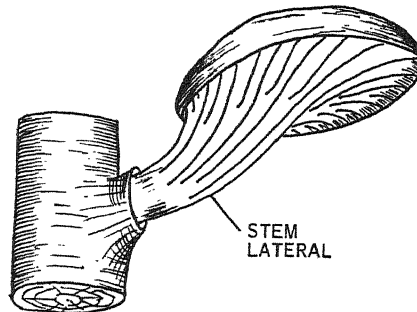
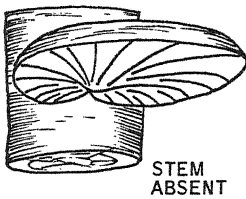
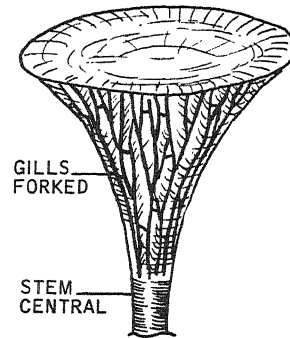
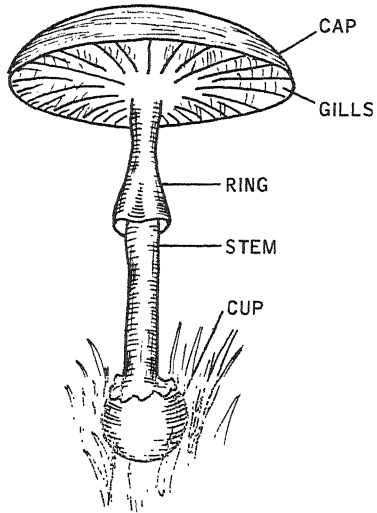
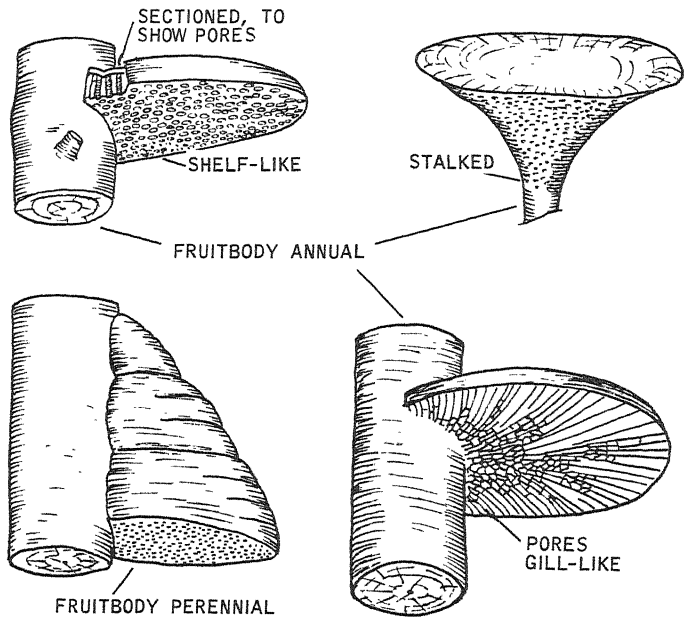


PLATE 1

POLYPORACEAE
PORE FUNGI
 (see page 151)



BOLETACEAE

(see page 188)

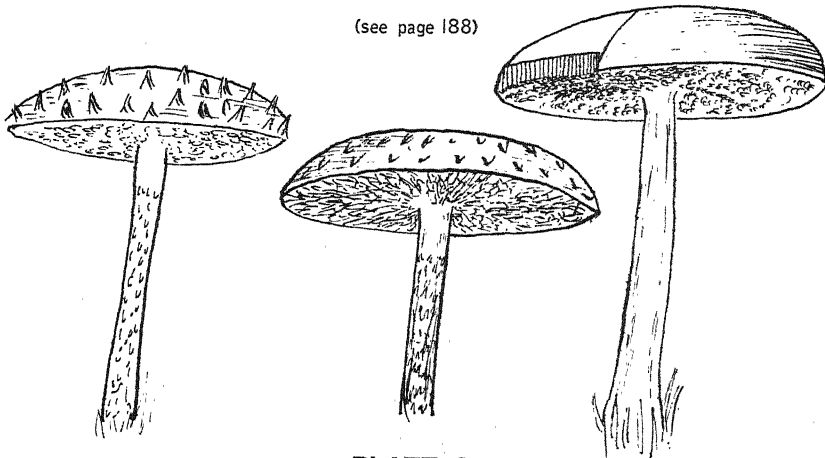
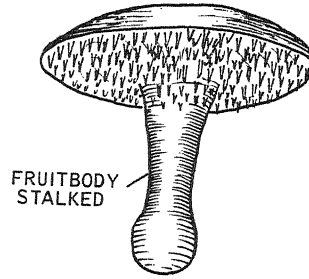
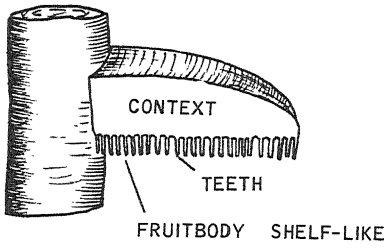


PLATE 2

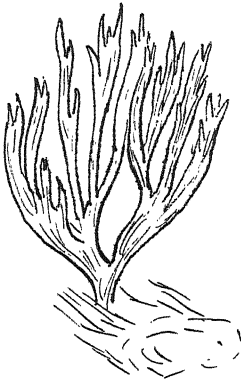
HYDNACEAE TOOTH FUNGI

(see page 183)



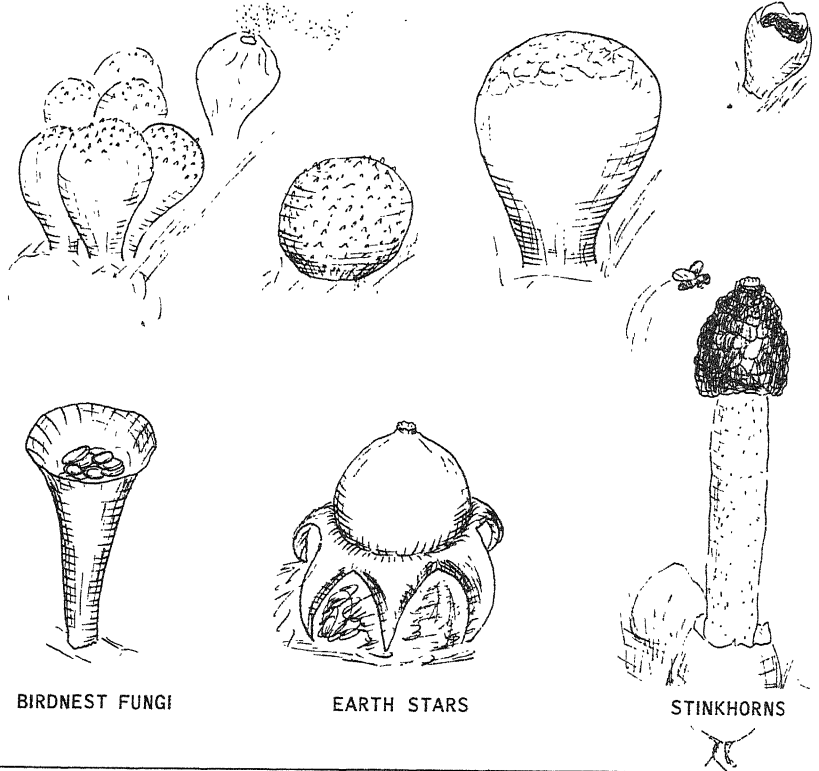
CLAVARIACEAE CLUB FUNGI

(see page 194)



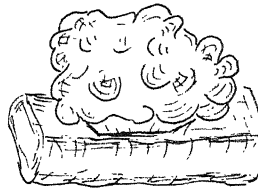
GASTROMYCETALES PUFFBALLS AND RELATIVES

(see page 197)



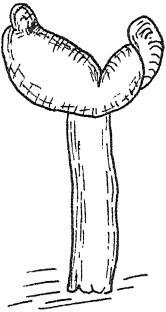
TREMELLALES JELLY FUNGI

(see page 214)

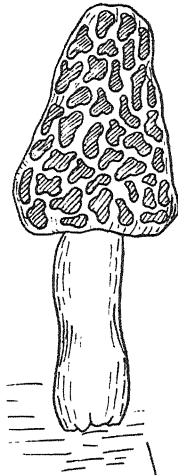


ASCOMYCETES **CUP FUNGI AND RELATIVES**

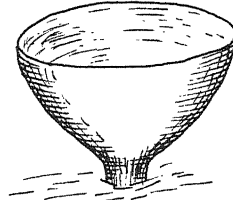
(see page 216)



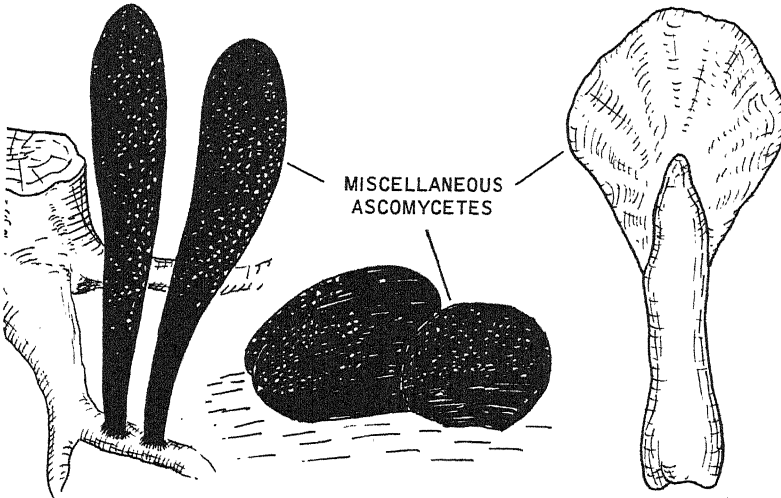
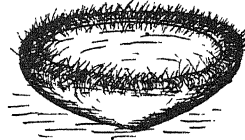
SADDLE FUNGI



MORELS



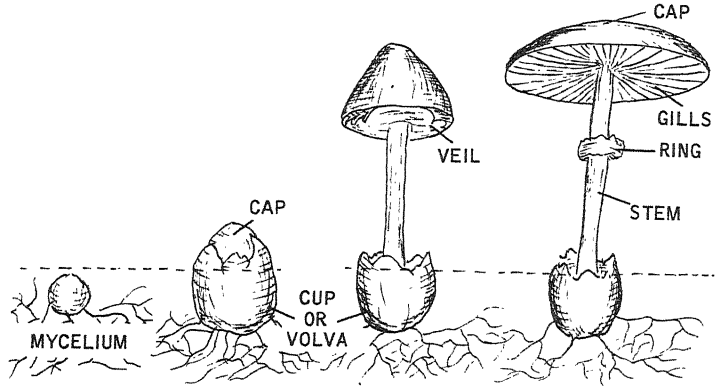
CUP FUNGI



MISCELLANEOUS
 ASCOMYCETES

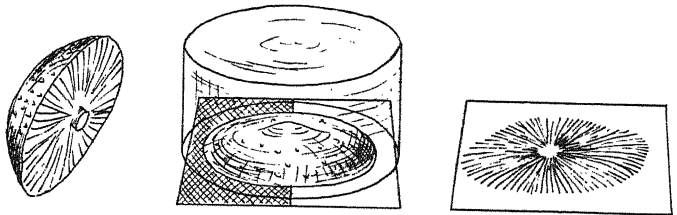
A TYPICAL MUSHROOM

(see page 9)



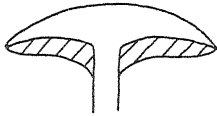
GROWTH AND STRUCTURE OF A TYPICAL MUSHROOM. FOOD AND WATER ARE TAKEN UP BY THE MYCELIUM, WHICH GROWS THROUGH AND DIGESTS LEAVES, WOOD AND OTHER PLANT REMAINS IN THE SOIL. THIS MYCELIUM MAY GROW FOR WEEKS, MONTHS OR EVEN YEARS BEFORE MUSHROOMS ARE PRODUCED. ONCE ESTABLISHED, THE MYCELIUM MAY PERSIST FOR YEARS OR EVEN CENTURIES.

HOW TO MAKE A SPORE PRINT



TO MAKE A SPORE PRINT, CUT OFF THE STEM JUST BELOW THE CAP, PLACE THE CAP ON PAPER, AND COVER IT FOR A FEW HOURS OR OVER NIGHT. A SPORE PRINT, AS SHOWN AT THE RIGHT ABOVE, CAN BE KEPT INDEFINITELY IF GENTLY HANDLED.

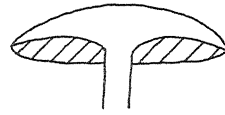
ATTACHMENT OF GILLS TO THE STEM



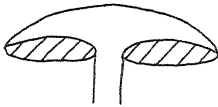
DECURRENT



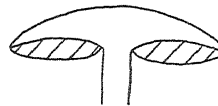
SINUATE



ADNATE

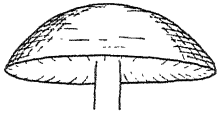


ADNEXED

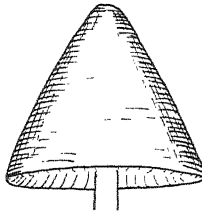


FREE

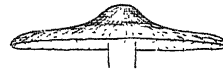
SHAPES OF CAP



CONVEX



CONICAL



UMBONATE

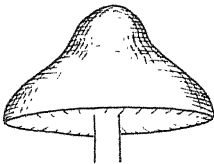
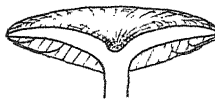
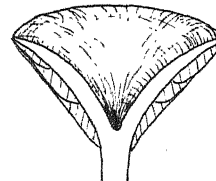




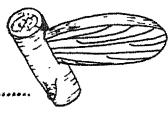

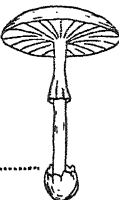
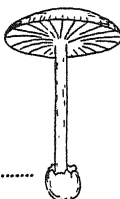

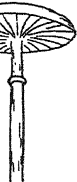
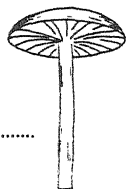
CAMPANULATE
OR BELL SHAPEUMBILICATE OR
DEPRESSED IN
THE CENTERFUNNEL
SHAPE

PLATE 7

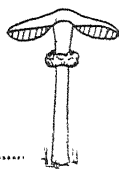
WHITE SPORED MUSHROOMS

1. Edge of gills prominently and irregularly serrate, fruit bodies tough and leathery - - *Lentinus*.....
Edge of gills even - - 2
2. Stem central - - 3.....
Stem eccentric or lateral - - 13.....
Stem lacking, fruit body shelflike, tough or woody in texture, on wood - - 15.....
3. Flesh of cap exuding white or colored juice when broken, cap usually depressed in the center - - *Lactarius*.....
Flesh of cap not exuding a milky juice - - 4
4. Stem with both volva and ring.....
- - *Amanita*.....
Stem with volva only.....
- - *Amanitopsis*.....
Stem with ring only - - 5.....

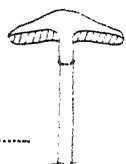
Stem with neither ring
nor volva - - 6



5. Gills free, ring prominent,
stem separating readily
from the cap - - *Lepiota*



Gills adnexed or short decurrent, stem
not separating readily from the cap,
ring often disappearing quickly
- - *Armillaria*



6. Gills sinuate - - *Tricholoma*



Gills not sinuate - - 7

7. Gills triangular in cross section, dis-
tant, usually with veins between
them, brittle and often of waxy con-
sistency - - *Hygrophorus*



Gills not noticeably triangular or
waxy - - 8

8. Gills decurrent - - 9
Gills not decurrent - - 10

9. Gills in the form of thick, fold-like
ridges, often forked
- - *Cantharellus*



Gills thin and plate like

- - Clitocybe



10. Cap and stem tough, withering but not decaying
when dried, reviving when moistened

- - Marasmius

Not reviving when moistened - - 11

11. Flesh of cap very brittle and almost
granular, stem stout - - Russula



Flesh of cap not very brittle,
stem rather slender - - 12

12. Margin of young cap inrolled,
mature cap expanded

- - Collybia



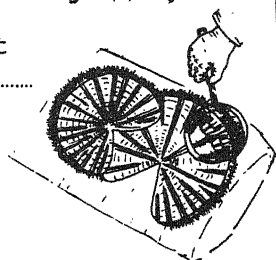
Margin of young cap straight,
mature cap conical or bell
shaped - - Mycena



13. Gills longitudinally split

- - Schizophyllum

Gills not split - - 14



14. Cap fleshy - - Pleurotus

Cap thin, tough, and
leathery - - Panus

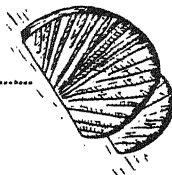
15. Gills vein like, margin of cap lobed

- - Trogia



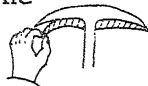
Gills thin and plate

like - - Lenzites



YELLOW-BROWN SPORED MUSHROOMS

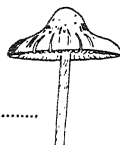
1. Ring present - - *Pholiota*
Ring absent - - 2
2. Gills separating easily from the
cap - - *Paxillus*
Gills not separating easily
from the cap - - 3
3. Stem lateral or absent - - *Crepidotus*
Stem central - - 4
4. On wood, gills yellow or rusty yellow
- - *Flammula*
On the ground, gills tan or brown - - 5
5. Cap conical - - 6
Cap convex or campanulate - - 7
6. Plants very fragile, surface of cap
smooth or striate - - *Bolbitis* &
Galera
Plants not fragile, surface of cap
cracked or scaly - - *Inocybe*
7. Stem cartilaginous, brittle - - *Naucoria*
Stem fleshy or fibrous - - 8
8. Inner veil of young plants suggesting
the texture of a cobweb, with each
hypha composing it distinct and
separate - - *Cortinarius*
Inner veil usually absent, when present not
cobwebby - - 9




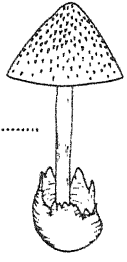

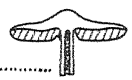

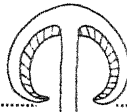



9. Surface of cap radially cracked
or scaly, not sticky

- - *Inocybe*

Surface of cap smooth, often
sticky - - *Hebeloma*



PINK SPORED MUSHROOMS

1. Stem lateral or absent, on wood
 - - *Claudopus* 
 Stem central - - 2
2. Cup at the base of the stem,
 no ring on the stem
 - - *Volvaria* 
 Neither cup nor ring present
 - - 3
3. Gills free, cap separating easily from
 the stem - - *Pluteus*
 (*P. cervinus* often confused with
 yellow-brown spored group) 
 Gills not free - - 4
4. Stem fleshy or fibrous - - 5
 Stem cartilaginous, slender - - 6
5. Gills sinuate or seceding 
 - - *Entoloma*
 Gills decurrent or adnate 
 - - *Clitopilus*
6. Gills decurrent - - *Eccilia*
 Gills not decurrent - - 7
7. Pileus convex, margin at first
 incurved - - *Leptonia*  
 Pileus bell shaped or conical,
 margin at first straight
 - - *Nolanea*  
 (no species described)

PURPLE-BROWN SPORED MUSHROOMS

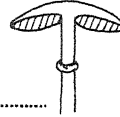
1. Ring present on the stem - - 2
Ring absent - - 3

Gills free

- - Agaricus

Gills attached to the

stem - - Stropharia



3. Veil present, the remnants of it hanging from the margin of the cap
- Hypholoma

Veil absent or evanescent, stem
slender - - 4



4. Margin of cap at first straight - - Psathyra
Margin of cap at first incurved - - Psilocybe

BLACK SPORED MUSHROOMS

1. Cap and gills liquifying, beginning
at the margin and progressing
toward the center of the cap
- - *Coprinus*



Cap and gills not liquifying - - 2

2. Gills decurrent, waxy, cap
sticky - - *Gomphidius*
(no species described)

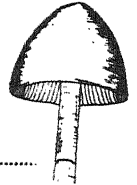


Gills not decurrent - - 3

3. Cap striate or furrowed
- - *Psathyrella*



Cap not furrowed - - *Panaeolus*



WHITE SPORED MUSHROOMS

Genus AMANITA

The genus is characterized by white spores, free gills, a stem which is easily separated from the cap, and theoretically by the presence of both ring and volva. The ring always is present in newly expanded specimens, but may be inconspicuous in older ones. The volva sometimes is prominent, sometimes is almost hidden in the ground, and in some species consists only of scaly remnants or faint ridges around the swollen base of the stem. This volva or cup is rather conspicuous in some of the more poisonous species of Amanita, and has given rise to the idea that this "death cup" is a sure sign of a poisonous mushroom, an idea which is completely erroneous. Such a cup is present and prominent in some edible species of the genus, and nearly lacking in some of the poisonous species. The writer would feel uneasy about eating any species of Amanita.

Key to Species of Amanita

1. Volva forming a definite, cup shaped, loose sheath around the base of the stem (often beneath the surface of the soil) - - 2
 Volva forming a collar-like ring, broken concentric rings, or scales on the swollen base of the stem - - 3
2. Cap pure white - - A. verna
 Cap tan to brown, at least in the center - - A. phalloides
 Cap yellow to brown, often spotted with wart-like patches - - A. mappa

3. Cap white or pale gray, densely covered with prominent, soft, pyramidal scales
- - *A. solitaria*
Cap of mature plants dull red, usually with scattered gray or pale reddish warts
- - *A. rubescens*
Cap yellow to orange, usually with scattered white warts - - 4
4. Margin of cap prominently striate, ring often disappearing - - *A. russuloides*
Margin inconspicuously or not at all striate, ring persistent - - 5
5. Remains of volva appearing as prominent broken, concentric rings on the base of the stem, diameter of the cap usually more than 8 cm.
- - *A. muscaria*
Volva forming a single, inrolled, collar-like ring, cap usually less than 7 cm. wide
- - *A. frostiana*
Remains of the volva appearing as scattered scales on the base of the stem, cap usually less than 7 cm. wide - - *A. flavoconia*

Description of Species of *Amanita*

1. *AMANITA FLAVOCONIA*. Probably poisonous. Cap 3 - 8 cm. wide, convex to flat, often with a small umbo in the center. Surface slightly sticky, yellow to orange, spotted with soft, pale yellow, wart-like patches which sometimes disappear with age, margin not striate. Flesh 3 - 5 mm. thick, white, soft. Gills 15 - 20 per cm. at the edge of the cap, 3 - 6 mm. wide, free, white, edge usually delicately fringed when seen with a hand lens. Stem 6 - 10 cm. long, 4 - 8 mm. thick at the top, tapering slightly upward, enlarged at the base, often covered with woolly, yellowish

scales. Ring thin, yellow. Volva or cup thin, inconspicuous, quickly disappearing or remaining only as powdery patches of mycelium on the swollen base of the stem. Solitary or scattered on the ground in deciduous and coniferous woods. It resembles *A. frostiana* and small specimens of *A. muscaria*, but the lack of striations on the margin and the absence of broken concentric rings at the base of the stem make it fairly easy to distinguish from these.

2. *AMANITA FROSTIANA*. Not poisonous, but to be avoided. Cap 3 - 6 cm. wide, convex or flat, surface slightly sticky when fresh, yellow to reddish orange, usually with white warty patches of mycelium, margin inconspicuously ridged. Flesh white, thin, soft. Gills about 20 per cm., 4 - 6 cm. wide, wider toward the margin, free, white or pale yellow. Stem 4 - 8 cm. long, 4 - 6 cm. thick at the top, tapering gradually upward, enlarged into a bulb at the base. Ring thin, often disappearing quickly in dry weather. Volva or cup apparent only as one or more regular or broken concentric rings or an inrolled collar like a ring on the enlarged base of the stem. Solitary or scattered, on the ground or on very decayed wood, in coniferous and mixed woods. It resembles *A. muscaria*, but is smaller and has spherical spores, while the spores of *A. muscaria* are oval. Because of its resemblance to both *A. muscaria* and *A. flaviconia*, and the possibility of confusing it with these, it should not be eaten.

3. *AMANITA MAPPA*. Deadly poisonous. Cap 4 - 8 cm. wide, convex to flat, surface white, yellow or brown, often darker in the center, with prominent soft scales, margin not striate. Flesh white. Gills about 20 per cm., 4 - 8 mm. wide, free but often extending to the stem as faint raised lines or ridges, white, the edge sometimes fringed when viewed with a lens. Stem 4 - 8 cm. long, 10 - 15 mm. thick at the top, white or tan,

enlarged abruptly at the base to form a large bulb up to 3 cm. in diameter, which is concave on top. Ring white or straw-color, fairly prominent, volva or cup either disappearing quickly or projecting beyond the margin of the bulb. Scattered on the ground, in coniferous and deciduous woods.

4. *AMANITA MUSCARIA*. Poisonous. Cap 8 - 24 cm. wide, egg-shaped in young plants, convex, flat or slightly concave when mature, surface pale yellow to orange-red, usually spotted with numerous white or pale yellow warts which sometimes are in concentric rings, margin faintly striate or ridged. Flesh white, pale yellow just under the cuticle or top skin. Gills about 20 per cm., 8 - 15 mm. wide, free or short decurrent in narrow ridges, white or pale yellow. Stem 10 - 20 cm. long, 1 - 2 cm. thick at the top, tapering upward, enlarged at the base to form a bulb, the bulb and lower part of the stem encircled by irregular broken rings or ridges, white or pale yellow. Ring or annulus white, soft, at first prominent but later often drying and becoming inconspicuous. Volva or cup sometimes definite, but most often becoming inconspicuous as the plants age, and appearing only as ridges on the lower stem and bulbous base. Solitary or in groups, sometimes in fairy rings, frequently under spruce trees. It is found in many different situations, and often is abundant. Several varieties have been described, all of which apparently are poisonous. It is said to have been used in regions of Siberia as an intoxicant, small quantities of it inducing symptoms somewhat resembling those of an overdose of alcohol. Small pieces of it broken up and placed in water attract houseflies, which soon are killed by ingesting it, whence the name "fly agaric."

5. *AMANITA PHALLOIDES*. Deadly poisonous. Cap 5 - 15 cm. wide, flat or with a small umbo in the center, tan to gray-brown, often paler toward the margin, surface sticky when moist (dry specimens must be moistened to determine this), sometimes with a few soft warts or delicate shreds of the volva scattered over the cap, margin smooth. Flesh white, firm, 3 - 5 mm. thick. Gills 15 - 20 per cm., 7 - 12 mm. wide, widest near the margin, free from the stem but often connected to it by means of fine, raised ridges, white, edge delicately toothed. Stem 8 - 20 cm. long, 6 - 15 mm. thick at the top, even or tapering upward, white or light brown, enlarged at the base into a rounded bulb that is below the surface of the ground. Ring white, at first prominent and flaring, striate or ridged on the upper side, later collapsing on the stem and almost disappearing. The cup or volva surrounding the buried bulb is soft, white, and irregularly torn. Solitary or scattered on the ground or on rotten wood, usually in deciduous forests and groves. This species is distinguished from *A. verna* chiefly by the brown color of the cap, and some authors consider these two to be merely different varieties of the same species. Like *A. verna*, it often is very abundant, and because of this and of its attractive appearance and odor often has been eaten, and has been responsible for numerous cases of fatal poisoning.

6. *AMANITA RUBESCENS*. Edible, but best avoided. Cap 5 - 12 cm. wide, convex, campanulate, or rarely almost flat, surface pale brown to reddish brown, slightly sticky when fresh and moist, spotted with white or pale red warts of mycelium, margin curved downwards, not at all or only faintly striate or ridged. Flesh white, becoming reddish where bruised. Gills about 20 per cm., 8 - 12 mm. wide, white, edge often slightly fringed when observed with a lens. Stem 8 - 20 cm. long, 8 - 15 mm. thick at the top, tapering upward,

enlarged gradually at the base into a rounded bulb, pale red, becoming darker red where bruised. Annulus conspicuous, flaring, often ridged on the upper side. Volva soon disappearing. Solitary or scattered in deciduous or mixed woods, occasionally an open ground.

7. *AMANITA RUSSULOIDES*. Probably poisonous. Cap 6 - 15 cm. wide, conical or hemispherical when young, flat or depressed in the center when mature, straw yellow to white, very sticky when moist, with scattered, prominent white warts that are larger toward the center of the cap, the margin with rather obvious furrows and ridges 1 - 3 cm. long that become more prominent as the plant matures. Flesh white, soft, 4 - 8 mm. thick at the center of the cap, disappearing where the furrows begin on the margin. Gills white, free, about 12 - 15 per cm., 6 - 12 mm. wide. Stem 8 - 18 cm. long, 8 - 12 mm. thick near the top, increasing gradually in thickness toward the base, often thicker at the top than just below, white, very brittle. Annulus one-third the way down from the top of the stem, thin, prominent at first but soon drying and disappearing. The cup or volva is a bulb with an inconspicuous margin, sometimes only a bulb with broken rings on the upper side and tapering to a point below. Solitary or scattered, usually in deciduous forests, but sometimes on lawns.

8. *AMANITA SOLITARIA*. Edible but best not eaten. Cap 8 - 15 cm. wide, at first spherical, later flat, surface white or nearly so, when young covered with large, pyramidal brown warts which become less prominent as the cap expands. Flesh white. Gills about 20 per cm., 5 - 10 mm. wide, free, white or yellowish. Stem 8 - 18 cm. long, 1 - 2 cm. thick at the top, enlarged rather gradually into a bulb which tapers into a rootlike base. The bulb of young plants is adorned with concentric rings of warty tufts similar to those on the

cap, but these become inconspicuous in older specimens. Annulus or ring thin, small, white or yellowish, collapsing on the stem and often disappearing. Usually solitary on the ground in deciduous woods.

9. *AMANITA VERNA*. Deadly poisonous. Cap 6 - 15 cm. wide, first oval, then convex to flat, surface white, slightly sticky when fresh and moist, margin not ridged. Flesh thin, white, soft. Gills about 20 per cm., 6 - 12 mm. wide, free or short decurrent in the form of faint ridges, edge of gills in old specimens often faintly serrate. Stem 8 - 20 cm. long, 1 - 2 cm. thick at the top, tapering upward gradually, slightly enlarged at the base to form a bulb which usually is beneath the surface of the ground. Ring white, soft, at first prominent, soon collapsing on the stem and sometimes disappearing. Volva or cup white, soft, margin irregularly torn; often the entire volva is beneath the surface of the ground, and older specimens must be excavated with some care to find it. Solitary or in groups, usually in hardwood or mixed forests, but sometimes in open places. This mushroom, because of its extreme poisonousness (even a small piece of it apparently is sufficient to cause death), its wide distribution, abundance, and attractive appearance, probably has been responsible for more cases of fatal mushroom poisoning than any other species. Those inclined to eat wild mushrooms gathered at random and identified only casually should read the detailed and graphic descriptions of poisoning given in the back of "Mushrooms and Toadstools", by Gussow and Odell.

Genus *AMANITOPSIS*

This genus differs from *Amanita* chiefly in that it lacks a ring on the stem. Only a few species have been described, and of these *A. vaginata* is the only

one found at all commonly.

1. *AMANITOPSIS VAGINATA*. Edible. Cap 5 - 10 cm. wide, at first oval or convex, layer flat, white, gray, or pale orange yellow, surface smooth and slightly sticky when young and moist, margin prominently ridged. Flesh thin, white, soft. Gills 12 - 15 per cm., white, free. Stem 9 - 15 cm. long, 6 - 10 mm. thick at the top, tapering slightly upward, brittle, white, the base extending 2 - 3 cm. into the ground. Volva or cup white, clinging closely to the stem, usually apparent only when the plant is pried carefully out of the ground. Solitary or scattered in forests and wooded areas, and often very common.

Genus *ARMILLARIA*

The name *Armillaria* is derived from a Latin word meaning "a ring", referring to the ring or annulus on the stem, but the name is not too fitting because the ring often is very inconspicuous and short lived, and frequently is visible only on young specimens. About 20 species of the genus have been described, but *A. mellea* is the only one known to be common.

1. *ARMILLARIA MELLEA*. Edible. Cap typically 5 - 13 cm. wide (the writer has found giant specimens with caps close to 20 cm. wide) at first spherical and the margin attached to the stem by a veil of woolly mycelium in which the individual hyphae or threads are visible, convex to plane when mature, often with an umbo. The color varies from pale wood brown, which is typical, to dark brown at one extreme, and to ochre yellow at the other. The surface usually is covered with tiny scale-like tufts that are darker than the cap surface. The surface of young, fresh specimens is very sticky, almost slimy, but this disappears if the humidity is at all low, and then the caps must be

soaked in water for some minutes before this stickiness is apparent. Flesh white, firm, 8 - 20 mm. thick near the stem, usually becoming abruptly thin and almost disappearing about two-thirds the way from the stem to the margin, where the margin begins to turn down. Gills usually 18 - 20 per cm., 6 - 11 mm. wide near the stem, narrowing gradually toward the margin, white or pale yellow, decurrent, often continuing down the stem as faint ridges as far as the ring. Stem 5 - 20 cm. long, 1 - 2.5 cm. thick, uniform in diameter until near the base, which may taper downward into a pointed "root", pale tan to brown, shiny, often becoming brown where bruised, definitely striate, often twisted, fibrous, white inside, solid, the outside tough, the inside brittle. Veil white or pale yellow, at first soft and wooly, thin, with the individual filaments visible; just after breaking it stands out from the stem like a collar, but soon it collapses and often it disappears entirely, making identification somewhat difficult. The fungus often fruits in abundance around stumps of trees that have been cut, or that have died, and is very common both in towns and in the woods. It often has been blamed as a cause of root rot and death of shade, orchard and forest trees, but there is good evidence that it follows, rather than causes, the death of most of these trees.

Genus CANTHARELLUS

The most obvious distinguishing characters of the genus are the vase or funnel shape of the cap, and the decurrent, forked gills that in most species are so thick that they appear more like ridges than true gills. All species are edible, some are excellent for eating, and in Europe one or two of them are collected in quantity for food.

Key to Species of *Cantharellus*

1. Gills thin, rather crowded, cap and gills golden or orange color - - *C. aurantiacus*
Gills thick and ridge-like - - 2
2. Top of cap covered with large, prominent scales
- - *C. floccosus*
Cap not scaly - - 3
3. Cap and gills chrome yellow, cap flat or shallow funnel shape - - *C. cibarius*
Cap tan to brown, gills tan, the depression in the center of the cap of ten extending into the hollow stem - - *C. infundibuliformis*

Description of Species of *Cantharellus*

1. *CANTHARELLUS AURANTIACUS*. Edible. Cap 5 - 9 cm. in diameter, at first convex, later shallow funnel shape, golden or orange yellow, darker in the center, margin curved down or elevated, when elevated usually wavy. Flesh white, 7 - 10 mm. thick near the stem, soft. Gills 20 - 30 per cm. 3 - 5 mm. wide, 1/4 - 1/2 mm. thick, thicker at the stem, frequently forked, short decurrent, colored like the cap. Stem 1.5 - 3 cm. long, 1 - 1.5 cm. thick at the top, tapering upward, reddish brown. Singly or in clumps of two or three on the ground or decayed wood.
2. *CANTHARELLUS CIBARIUS*. Edible. Cap 3 - 12 cm. wide, first convex, then flat, later shallow funnel shape, margin first curved in, later curved down to upraised, often wavy. Flesh 1 - 2 cm. thick at the stem, white, fibrous. Gills 15 per cm., 2 - 4 mm. wide, edges blunt, often anastomosing or growing together near the margin, decurrent on the stem, chrome or pale yellow. Stem 3 - 6 cm. long, 6 - 15 mm. thick at the top, tapering

downward or uniform in diameter, base enlarged, same color as gills or paler. Scattered or in fairly dense groups, on the ground in both hardwood and coniferous forests.

3. *CANTHARELLUS FLOCCOSUS*. Edible. Cap 5 - 8 cm. wide, at first conical or almost cylindrical with a flat top, later shallow funnel shape, scaly, yellow to pale orange, margin curved downward or rolled inward. Flesh white, firm. Gills 8 - 12 per cm., 1 - 2 mm. wide, 1 mm. thick, ridge like, long decurrent but ending rather abruptly on the stem, frequently forked and joined, yellow to reddish yellow. Stem 3 - 6 cm. long, 1 - 2 cm. thick, uniform in diameter, solid, pale yellow, often with white mycelium at the base. Solitary to scattered, on the ground in upland hardwood and conifer forests.

4. *CANTHARELLUS INFUNDIBULIFORMIS*. Edible but too small to be interesting for eating. Cap 1.5 - 5 cm. wide, funnel shape or depressed in the center, the depression often continuing down into the interior of the stem, yellow to brown, smooth, the margin curved down, usually wavy and often lobed. Flesh 1 - 3 mm. thick, pliable. Gills 8 - 10 per cm., 2 - 4 mm. wide, 1 mm. thick, edge blunt, frequently forked, tan, decurrent. Stem 3 - 8 cm. long, 3 - 8 mm. thick, tan to yellow, hollow, often irregularly flattened. Scattered or in groups on the ground in swamps in conifer and hardwood forests.

Genus CLITOCYBE

Clitocybe means "sloping head", descriptive of the decidedly funnel shape cap of several of the common species. The genus is characterized by white spores, decurrent or adnate gills, and the rather tough stem that is not separable from the cap. Kauffman, in

"Agaricaceae of Michigan" describes 42 species, and there doubtless are a number of others, not yet adequately known. Many of the species vary considerably and grade into one another, and thus are difficult to identify with certainty, but a number of them can be identified with relative ease.

Key to the Genus *Clitocybe*

1. Growing on wood - - 2
 Growing on the ground - - 4
2. Cap 1-3 cm. wide - - *C. truncicola*
 Cap 3-8 cm. wide - - 3
3. Cap not scaly, pale watersoaked gray when moist,
 white when dry - - *C. eccentrica*
 Cap covered with tiny dark scales, tan or reddish brown - - *C. ectypoides*
4. Gills bright yellow, orange, salmon, or purple brown - - 5
 Gills white, pale gray, pale tan, or pale yellow - - 6
5. Cap bright yellow or orange, gills yellow to orange red - - *C. illudens*
 Cap and gills pale watery red, salmon, or purple, gills thick, waxy, distant, with prominent veins between them - - *C. laccata*
 Cap and gills purple brown when moist, grayish when dry - - *C. ochropurpurea*
6. Cap funnel shaped or depressed in the center - - 7
 Cap convex or plane - - 11
7. Cap of mature plants over 10 cm. in diameter - - 8
 Cap of mature plants less than 8 cm. in diameter - - 9

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8. Gills 1-1.5 cm. wide, plants usually in dense groups - - *C. gigantea*
Gills 4-7 mm. wide, plants usually scattered
- - *C. candida*
9. Cap reddish brown, darker in the center
- - *C. sinopica*
Cap watery tan to dirty white, narrow funnel shaped - - *C. caespitosa*
Cap pale reddish tan to tan, margin usually with forked striations - - *C. infundibuliformis*
Cap grayish brown, shallow funnel shaped
- - *C. parilis*
Cap shiny white - - 10
10. Cap 1-4 cm. wide, usually in fields or grassy deciduous woods - - *C. dealbata*
Cap 3-12 cm. wide, usually in coniferous woods
- - *C. albissima*
11. Plants in dense clumps, numerous stems arising from a common base - - 12
- Plants solitary, scattered, or near one another, but not with numerous stems arising from a common base - - 14
12. Gills of mature plants 1-1.5 cm. wide
- - *C. gigantea*
Gills less than 1 cm. wide - - 13
13. Cap covered with a tough skin or cuticle than can be peeled off - - *C. cartilaginea*
Cap without a tough cuticle - - *C. multiceps*
14. Cap grayish brown, plants scattered - - *C. parilis*
Cap shiny white, usually numerous plants growing near together - - 15

15. Cap 1-4 cm. wide, usually in fields or grassy deciduous woods - - *C. dealbata*
Cap 3-12 cm. wide, usually in coniferous woods
- - *C. albissima*

Description of Species of *Clitocybe*

1. *CLITOCYBE ALBISSIMA*. Edibility unknown. Cap 3-12 cm. wide, usually flat but varying from slightly convex to slightly depressed in the center; when young the cap often is pale bluish gray with an inrolled, striate margin, but the bluish color is not invariably present. When older the cap is watery translucent tan when moist, especially in the center, but uniform shiny white when dry. The margin remains curved down even in mature specimens. Flesh 5-10 mm. thick at the stem, tapering sharply to 0.5 mm. near the margin, white, spongy to firm. Gills 25-30 per cm., at the margin of the cap, 3-6 mm. wide, first white, yellowish in old specimens, short decurrent or often extending down the stem for 5-10 mm. as faint ridges, sometimes growing together on or near the stem, separable from the flesh of the cap, edge serrate in age. Stem 4-7 cm. long, 6-12 mm. thick, white to pale yellow, uniform in diameter, the lower part covered with white mycelium and often curved, the rind cartilaginous or brittle, the interior fibrous. Often several stems are joined at the base. The species usually has a slight fragrant odor suggestive of licorice. Scattered or in groups, usually in conifer woods, sometimes in partial rings near stumps and trees.

The gills descending the stem in lines, and sometimes anastomosing on the stem, are supposed to be characters peculiar to *C. piceina*, a somewhat larger species. However, all the specimens collected by the writer at numerous times throughout a period of more than 10 years in northern Minnesota had minutely

echinulate spores, described by Kauffman as unique for *C. albissima*. The spores usually contained a large oil droplet, as those of *C. piceina* are supposed to do. It is quite possible that the two species grade into one another and comprise a series of indistinguishable forms.

2. *CLITOCYBE CAESPITOSA*. Edibility unknown, but probably edible. Cap 2-6 cm. wide, deep funnel shape with a decurved margin, often irregular from contact with adjacent specimens, watery tan when moist, almost white when dry. Flesh watery tan, 1-2 mm. thick at the stem, at most 1 mm. thick at the margin. Gills 20-25 per cm., 1-2 mm. wide, decurrent, white. Stem 1.5-3.0 cm. long, 4-8 mm. thick, rind tough-brittle, white and fibrous inside, covered with dense white mycelium at the base. Usually in dense clumps, sometimes scattered, on the ground in woods or on compost heaps, rarely on very rotten wood.

3. *CLITOCYBE CANDIDA*. Edible. Cap first convex, later broad funnel shape, 10-30 cm. wide, white or very pale tan, smooth and shining. Flesh 1-2.5 cm. thick at the stem, white, firm; successive layers of flesh can be peeled off readily. Gills 4-7 mm. wide, 30-40 per cm., pointed at both ends, first rounded at the stem or almost sinuate, later short decurrent, first white, later pale yellow. Stem 1.5-4 cm. thick, 6-10 cm. long, white or pale yellow, solid, tough, fleshy-fibrous. In groups or dense clumps on the ground in conifer and mixed woods. This is considered by some to be a variety of *C. gigantea*.

4. *CLITOCYBE CARTILAGINEA*. Edible. Cap 4-8 cm. wide, flat or with a low, broad umbo, tan or brown in the center, becoming paler or almost white toward the margin. The texture of the surface sometimes suggests scales because the brown fibers separate somewhat. The

surface near the margin of fresh specimens often is slightly translucent and is rough or radially ridged, and the margins of young caps are definitely curved in. The cap is covered by a tough skin that can be peeled off. Flesh white, firm, slightly tough, 7-10 mm. thick near the stem, disappearing about 5-10 mm. from the margin, where the gills are covered only by the tough skin of the cap. Gills 20-30 per cm. at the margin, 3-5 mm. wide, short decurrent, adnate, or sinuate, white. Stem 3-6 cm. long, 8-20 mm. thick at the top, uniform in diameter or tapering slightly upward, sometimes enlarged toward the base, usually a number of stems arising from a common base. Scattered or in dense clumps and fairy rings on grassy ground under trees.

5. CLITOCYBE DEALBATA. Edibility unknown. Cap 1-4 cm. wide, convex when young, at maturity the margin raised and the center depressed, surface shiny white, the margin wavy. Flesh white, thin. Gills adnate in unexpanded caps, later short decurrent, white, narrow, crowded. Stem 2-5 cm. long, 2-3 mm. thick, sometimes flattened, tough, the base covered with woolly mycelium. In groups of 2 to 5 on leaf mold in deciduous woods and sometimes in lawns and pastures.

6. CLITOCYBE ECCENTRICA. Probably edible, but not tested. Cap 2-6 cm. wide, flat, very shallow funnel shape or slightly convex, the margin sometimes curved down slightly; the surface watersoaked gray and quite smooth when moist, white when dry and appearing silky when viewed with a lens. Flesh 2-4 mm. thick at the stem, gradually becoming thinner toward the margin, gray when moist, white when dry, slightly fibrous but brittle. Gills 35 per mm. at the margin, 3-4 mm. wide where widest, tapering to a point at both ends, short decurrent. Stem 2-4 cm. long, 4-6 mm. thick, often attached to the cap in an eccentric fashion, that is, off the center, uniform in diameter, rather tough and fibrous,

pale tan or nearly white, the base or often the entire lower half covered with white woolly mycelium. White, branched strands of mycelium up to about a mm. thick run out from the base of the stem through the decayed wood or sawdust on which the plants grow. Scattered or in groups of a few on very decayed wood.

7. CLITOCYBE ECTYPOIDES. Edibility unknown. Cap 6-8 cm. wide, broad funnel shape with a narrow central depression and down curved margin; surface reddish brown when moist, yellowish tan when dry, darker toward the margin, with darker radial streaks and many tiny dark scales. Flesh 2 mm. thick, tan, watery, firm. Gills 15-20 per cm. at the margin, many short and narrow gills, the largest 3-4 mm. wide, pale tan, decurrent and ending abruptly on the stem, pointed at both ends, occasionally forked. Stem 3-5 cm. long, 4-6 mm. thick, tan above, the base or the entire lower half covered with white mycelium, hollow, fibrous. Scattered on decaying conifer logs.

8. CLITOCYBE GIGANTEA. Edible. Cap 4-20 cm. in diameter, first convex with the margin inrolled, later flat or shallow funnel shape, surface ivory white to light tan when young, tan when old, shiny when dry, the margin often wavy. Flesh white, fibrous, 0.5-2.5 cm. thick at the stem, 1 mm. thick at the margin. Gills white to pale tan, occasionally forked, sometimes fusing with one another at the stem, decurrent to sinuate, 1-1.5 cm. wide in mature specimens, 15-20 per cm. at the margin, easily separated from the cap. Stem 1.5-5 cm. in diameter at the top, uniform in diameter, or sometimes narrowed toward the base and the very base slightly enlarged, often curved toward the base, solid and fibrous, frequently with 2 to 10 stems joined at the base. Usually in groups and clusters in grassy woods, sometimes covering several square yards.

9. *CLITOCYBE ILLUDENS*. Poisonous. Cap 6-15 cm. wide, at first convex with the margin curved down or inrolled, but at maturity becoming flat or shallow funnel shape, often with a small round or pointed umbo in the center, bright yellow or orange yellow, with a dull silky sheen when dry, the margin sometimes lobed or wavy. Flesh 4-6 mm. thick near the stem, becoming gradually thinner outward and almost disappearing toward the margin, pale yellow, firm, rather dry, peeling readily in layers. Gills about 20 per cm. at the margin, 3-5 mm. wide, bright yellow or orange yellow, running down the stem 1-2 cm.. Stem 12-20 cm. long, 8-15 mm. thick at the top, uniform in diameter to near the base, where it tapers to a point, pale yellow outside and in, solid, very fibrous, usually curved. Ordinarily growing in dense clumps on stumps or logs, with the stems of 5 to 20 fruit bodies joined into a common base.

The fruit bodies, and especially the gills, are luminescent, sometimes strongly so, and because of this the fungus has been given the name of "jack o' lantern". A number of different mushrooms share this property of luminescence.

10. *CLITOCYBE INFUNDIBULIFORMIS*. Edible. Cap 3-5 cm. wide, at first convex with a slightly raised center, later depressed in the center and shallow to deep funnel shape, surface dry and silky, reddish when young, later reddish tan to tan, the margin first inrolled, later curved downward, in young specimens with net-like ridges extending in 5-10 mm. from the margin. Flesh white, 5-8 mm. thick at the stem, 1 mm. at the margin. Gills 20-25 per cm. at the margin, 2-3 mm. wide, white or pale cream color, decurrent, many short gills between the long ones, some wavy and with the edges split in a toothed fashion as the cap expands. Stem 2-6 cm. long, 5-8 mm. thick, uniform in diameter or tapering slightly either upward or

downward, spongy inside, the base often slightly enlarged and covered with white mycelium. Single, scattered or in dense groups on the ground in upland forests.

11. *CLITOCYBE LACCATA*. Edible. Cap 1.5-4 cm. wide, first convex then flat or shallow funnel shape, surface often with a slightly mealy texture, when moist pale tan, watery red, salmon color, mauve or purple, but paler when dry. Gills at the margin 10 per cm. or less, 3-7 mm. wide, up to 1 mm. thick, colored like the cap, often waxy in texture, decurrent to adnate, often with rather prominent veins between the gills on the under side of the cap. Stem 3-8 cm. long, 2-7 mm. thick, colored like the cap or paler, tough and fibrous, often twisted. Solitary, scattered or in clumps on ground or very rotten wood, from swamps to uplands. This species is unusual in several ways, one of which is that it has spherical, definitely spiny spores; it has been placed in several different genera, and it does not fit particularly well in any of them. It is very common and exceedingly variable in size, shape and color, and might well form a good subject for some interesting studies on genetics in relation to classification of higher fungi and to taxonomy in general. Certainly it offers interesting difficulties to those who consider that all living things can be separated into neatly compartmented pigeonholes.

12. *CLITOCYBE MAXIMA*. Edible. Cap 10-20 cm. wide, first convex, later flat to shallow funnel shape, surface pale tan when young, later darker and with flat scales. Margin first inrolled and covered with fine hairs, later curved down, flat or upraised. Flesh 1.5-3 cm. thick at the stem, rapidly thinner toward the margin, white, spongy. Gills 20-25 per cm. at the margin, 4-10 mm. wide, first sinuate, then short decurrent, white when young, soon pale yellow, easily separated from

the flesh of the cap. Stem 6-12 cm. long, 2.5-6 cm. thick at the top, base enlarged to form an oval or spherical bulb, slightly fuzzy, white or pale tan. Solitary, scattered or in groups on the ground in upland forests, sometimes in partial rings.

13. CLITOCYBE MULTICEPS. Edible. Cap 3-8 cm. wide, convex surface white or watery gray, margin first inrolled, later curved down. Flesh white. Gills 20-25 per cm. at the margin, adnate, sinuate, or decurrent. Stem 5-10 cm. long, 6-12 mm. thick, colored like the cap, a number of stems joined into a firm clump at the base. In dense clumps on the ground beside roads, in pastures and in open deciduous woods.

14. CLITOCYBE OCHROPURPUREA. Cap 5-20 cm. wide, at first almost hemispherical, later convex to plane or shallow funnel shape, surface purple brown when moist, grayish when dry, margin often wavy. Flesh slightly paler than the cap, tough. Gills distant from one another, thick, wide, adnate to decurrent, colored like the cap. Stem 5-20 cm. long, 1-2 cm. thick, often irregular in thickness, tough and fibrous, sometimes curved and twisted, colored like the cap or paler. Scattered or in groups on the ground in open places or deciduous woods.

15. CLITOCYBE PARILIS. Cap 1.5-3.5 cm. wide, convex when young, shallow funnel shape when mature, surface grayish brown, smooth and shining to the naked eye, but minutely scaly when viewed with a lens; margin curved down or flat. Flesh white, 2-3 mm. thick near the stem, soft. Gills at first pale gray, later pale yellow, long decurrent, 1-2 mm. wide, about 30 per cm. at the margin, many small gills at the margin visible only with a lens. Stem 2-3 cm. long, 2-4 mm. thick at the top, uniform in diameter or tapering downward slightly, white or pale gray, the base often

covered with white mycelium. Scattered or in groups on the ground in coniferous or mixed woods.

16. CLITOCYBE SINOPICA. Cap 3-5 cm. wide, depressed in the center, surface reddish brown, darker in the center, sometimes with minute, crowded, appressed or flat scales toward the center, margin curved down and wavy. Flesh 2-3 mm. thick near the stem, 1 mm. thick at the margin, white or pale tan. Gills 20-25 per cm. at the margin, 3-4 mm. wide, decurrent, occasionally forked, rather thick and with veins connecting adjacent gills, first white, then pale yellow or tan. Stem 3-6 cm. long, 5-8 mm. thick at the top, tapering downward slightly, same color as the cap or paler, solid, white and fibrous inside, brittle outside. Odor and taste rather strong and reminiscent of whole wheat meal. Usually scattered or in dense but small clumps on or near very decayed wood in swamps and moist situations.

17. CLITOCYBE TRUNCICOLA. Cap 1-3 cm. wide, obtuse or flat, sometimes shallow funnel shape, surface white, smooth and dull or shiny. Flesh 2-3 mm. thick near the stem, 1 mm. or less at the margin, pale gray and watersoaked in wet weather, white when dry. Gills white, about 50 per cm. at the margin, 1-2 mm. wide, pointed at both ends, short decurrent. Stem 2-4 mm. wide at the top, 1-3 cm. long, white, uniform in diameter or tapering slightly downward, fibrous, often curved (as when fruit bodies are growing on the side of a log), sometimes slightly off center. Scattered or in groups on fallen logs which still retain their bark, and sometimes on more thoroughly decayed wood.

Genus COLLYBIA

The genus is characterized by white spores, gills which are not decurrent but which vary from almost free to adnexed, a somewhat tough stem, and the in-rolled margin of the cap of young specimens. The cap of mature specimens of most species is flat to convex, often with the margin turned down.

Key to Species of Collybia

1. Growing on decayed wood - - 2
Growing on the ground - - 7
2. Gills purple - - *C. myriadophylla*
Gills not purple - - 3
3. Stem white - - 4
Stem tan to reddish brown, paler toward the cap
- - 5
4. Densely caespitose in groups of 20-100, cap 1-3
cm. wide, gills narrow and almost free
- - *C. familia*
Usually solitary, cap 6-15 cm. wide, gills 1-2
cm. wide, distant from each other and inter-
venose - - *C. longipes*
5. Cap shining as if waxed, stem and cap tan
- - *butyracea*
Cap not shining - - 6
6. Lower half of stem densely covered with reddish
brown hairs - - *C. velutipes*
Stem covered with white woolly mycelium at the
base, otherwise naked, plants in dense clumps
of 20 to 150 - - *C. abundans*

-
7. Stem with a definite, tapering, rootlike extension beneath the surface of the ground - - 8
Stem without a tapering root - - 9
8. Root 2-6 cm. long, extending straight down
- - *C. radicata*
Root up to 25 cm. long, usually horizontal
- - *C. longipes*
9. Cap and stem white, with rust colored soots
- - *maculata*
Cap and stem tan to reddish brown - - 10
10. Top of cap shining as if waxed or buttered
- - *C. butyracea*
Top of cap not shiny - - 11
11. Cap 6-12 mm. wide, stem 0.5 mm. thick
- - *C. stipitaria*
Cap wider and stem thicker - - 12
12. Gills yellowish brown, cap reddish brown when moist, yellow or tan when dry - - *C. aquosa*
Gills white or very pale tan - - 13
13. Stem hairy only at the very base - - *C. dryophila*
Stem covered with woolly white hairs that become sparse toward the top - - 14
14. Stem white, odor of crushed plants sharp and unpleasant - - *C. hariolorum*
Stem brown, odor of crushed plants not sharp and unpleasant - - *C. confluens*

Descriptions of Species of *Collybia*

1. *COLLYBIA ABUNDANS*. Cap 1-3.5 cm. wide, convex to almost plane, with a small umbo, light brown or tan, darker in the center, surface covered with a delicate fuzz, margin often split in several places. Gills pale tan, adnate, narrow, 20-25 per cm. at the margin. Stem 3-12 cm. long, 2-5 cm. thick, at first pale tan, later dark brown, lighter near the top, covered with white mycelium at the base. In dense clumps on decaying logs, with sometimes more than 100 specimens in a clump.
2. *COLLYBIA AQUOSA*. Cap 2-4 cm. wide, at first convex or umbonate, later plane or depressed in the center, watery brown when moist, yellow or yellowish brown when dry, the margin faintly striate for 2-3 mm. when moist. Flesh 2-3 mm. thick near the stem, brown when moist, pale yellow when dry. Gills 25-30 per cm. at the margin, 3-4 mm. wide, narrowly adnexed or free, yellowish tan. Stem 3-5 cm. long, 2-5 mm. thick, yellowish at the top, usually reddish brown toward the base, externally glabrous, sometimes flattened, fibrous inside and solid. In groups on the ground under conifers.
3. *COLLYBIA BUTYRACEA*. Cap 2-5 cm. wide, convex to flat, sometimes umbonate, translucent brown and shining as if waxed when moist, tan to almost white when dry. Flesh 2-4 mm. thick, tan when moist, white when dry. Gills 30-35 per cm. at the margin, 2-4 mm. wide, almost free, white, edge finely toothed when observed with a lens. Stem 3-6 cm. long, 2-6 mm. thick at the top, tapering slightly downward to a bulbous base which may be covered with white mycelium and surrounded by a closely held clump of dirt or decomposed wood, brown

toward the base and pale tan or almost white toward the top. Solitary, in groups, or in clumps of up to 10 specimens, on the ground or on very rotten wood.

4. *COLLYBIA CONFLUENS*. Edible. Cap 2-5 cm. wide, convex or flat, in old specimens with the margin turned up slightly, with or without an umbo, surface tan or watery brown when moist, darker in the center, pale tan when dry. Flesh 2-3 mm. thick at the stem, thinning gradually toward the margin, watery tan when moist, almost white when dry. Gills 40-50 per cm. at the margin, 1-2 mm. wide, rounded at both ends, free or rarely adnexed, pale tan. Stem 4-8 cm. long, 2-5 mm. thick, reddish brown, covered with short woolly white hairs which give it a frosty bloom, hairs less dense toward the top of the stem. The stem often is flat, the outer rind tough and fibrous, the interior first filled with fibrous mycelium, later hollow. In groups or dense clumps on the ground in woods. This species resembles *Marasmius* in that the fruit bodies shrivel somewhat in dry weather, but do not die and decay readily, and in moist weather revive again.

5. *COLLYBIA DRYOPHILA*. Edible. Cap 3-5 cm. wide, at first hemispherical, with a flat center, later convex to flat with the center depressed, tan to reddish brown. Flesh light tan, 2-4 mm. thick at the stem, becoming gradually thinner toward the margin, soft. Gills about 25 per cm. at the margin, 2-4 mm. wide, adnexed, adnate, or almost free. Stem 3-8 cm. long, 2-5 mm. thick at the top, tapering upward slightly, tough, hollow, at first light tan, later reddish brown, the base enlarged and covered with white mycelium. In groups of several to many specimens on the ground in forests. Sometimes irregular, convoluted, pale yellow growths that bear basidiospores are formed on the stem or the cap. These once were thought to be caused by a

parasitic fungus, and were named *Tremella mycetophylla*, but Buller and others have good evidence that they are only abnormal growths of *C. dryophila*, the cause of the abnormality being still unknown.

6. *COLLYBIA FAMILIA*. Edible. Cap 1-3 cm. wide, at first hemispherical, later convex to almost plane, usually with a small umbo, surface watersoaked pale tan when moist, almost white when dry, shiny, silky with fine radial fibers. Flesh white, thin. Gills 20-30 per cm. at the margin, 2-3 mm. wide, almost free, white. Stem 3-15 cm. long, 2-3 mm. thick, white, brittle, hollow, covered with white mycelium at the base. In dense clumps of 40 to 60 fruit bodies on rotten wood, frequently with several clumps appearing near one another simultaneously.

7. *COLLYBIA HARIOLARUM*. Cap 3-6 cm. wide, convex to flat, surface pure white with a tan center or brown to reddish brown in the center and paler toward the margin, glabrous or delicately pubescent, becoming very limp in wet weather or when moistened. Flesh 2-4 mm. thick near the stem, practically absent at the margin, soft and spongy, with definite unpleasant odor when crushed. Gills 25-35 per cm. at the margin, 2-3 mm. wide, fairly uniform in width from the stem to near the margin, ending in a point at the margin, white, free or nearly so. Stem 3-5 cm. long, (when growing out of cracks in rotten logs some stems may be 10 cm. or more long, but this is abnormal) 3-6 mm. thick, tapering upward slightly, white to pale reddish tan, tough to brittle, covered toward the base with velvety or woolly white hair which toward the top is short and inconspicuous but dense. Scattered, in groups or dense clumps on the ground or very rotten wood.

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8. *COLLYBIA LONGIPES*. Cap 3-8 cm. wide, convex to nearly flat, with a slight umbo, surface velvety from a dense covering of short hairs, brown in the center, paler toward the margin, with radial wrinkles in the center, margin at first inrolled, later curved down. Flesh thin, white. Gills 12-15 per cm. at the margin, 4-8 mm. wide, white, the sides often veined, the edge fringed when seen with a lens. Stem 6-15 cm. long, 4-5 mm. thick at the top, tapering upward gradually from the ground, white, covered with tiny brown flat scales, the base of the stem extending as a tapering, curved, rootlike growth as much as 25 cm. long down into the soil or decayed wood on which it grows. The rootlike extension of the stem must be excavated to be seen, since if the plants are merely pulled up sharply it will break off. Occurring usually as individual or widely scattered specimens.
9. *COLLYBIA MACULATA*. Edible. Cap 5-13 cm. wide, convex to flat, white with obvious rusty red spots, becoming reddish where bruised, margin curved down and sometimes wavy. Flesh white, 1-1.5 cm. thick at the stem, disappearing at the margin, fibrous spongy. Gills 25-30 per cm. at the margin 2-4 mm. wide, white, almost free, adnexed, or short decurrent. Stem 10-18 cm. long, 1-2 cm. thick at the top, uniform in diameter or tapering downward, usually with one or more bends or crooks, the rind brittle, the interior fibrous and in age hollow, the base extending into the soil for 5-8 cm., but without a definite root. Usually in groups of 5 to 10 on the ground in woods.
10. *COLLYBIA MYRIADOPHYLLA*. Cap 1.5-3.5 cm. wide, first convex, later flat or depressed in the center, surface at first lilac to purple, later brown when moist and grayish tan or with a tinge of lilac when dry, margin of old specimens wavy. Flesh 1-2 mm. thick in the center, very thin at the margin. Gills about 50 per

cm. at the margin, 2 mm. wide, adnexed, lilac or deep purple. Stem 3-6 cm. long, 2-3 mm. wide at the top, even or tapering either upward or downward, often flat, hollow, brittle, lilac or pale brown, often covered toward the base with coarse woolly lilac colored hair. Scattered or in groups on rotten conifer logs. The bright lilac or deep purple color of the gills make it a striking plant.

11. *COLLYBIA PLATYPHYLLA*. Edible. Cap 6-15 cm. wide, at first oval to campanulate, later convex, then flat or with the margin upraised, surface grayish brown in the center, paler toward the margin, streaked with delicate, dark, radial fibers, often radially cracked toward the margin, margin often wavy. Flesh 2-4 mm. thick, white or yellowish, brittle. Gills 5-10 per cm. 1-2 cm. wide, white to pale yellow, adnexed, often splitting in older plants, frequently with prominent veins between the gills where they are attached to the under surface of the cap. Stem 6-15 cm. long, 1-2 cm. thick at the top, white or tan, often twisted, even in diameter or tapering downward, solid, base rounded and sometimes bulbous. Usually solitary, especially growing from the interior of hollow, rotten stumps, but sometimes scattered or in groups of a few specimens on rotten logs.

12. *COLLYBIA RADICATA*. Edible. Cap 3-12 cm. wide, campanulate, flat, or with the margin raised slightly, usually with an umbo, surface white or pale tan, the umbo darker, or the entire cap dark tan and with slight or prominent radial furrows, dry to very sticky. Flesh thin, white. Gills 10 per cm. at the margin, 5-15 mm. wide, short decurrent to adnexed, white, thick rather prominently veined on the sides where they are attached to the under side of the cap. Stem 6-15 cm. long, enlarged at the ground line and tapering into a root-like extension 2-4 cm. long, 0.3-1.6 cm. thick at the cap, tapering upward, fibrous,

straight or twisted, white or pale tan. Scattered or in groups on the ground around hardwood stumps and trees. There may be great differences between individuals of the same clump - the cap of one may be dark tan, very sticky and have prominent radial furrows, while that of the one next to it is white, almost dry, and has inconspicuous furrows on the cap.

13. COLLYBIA STIPITARIA. Cap 6-12 mm. wide, slightly convex or flat, with a small definitely outlined depression in the center, surface dark brown to black in the center, otherwise pale brown with radial ridges composed of brown hairs, almost white between the ridges. Flesh very thin, tough. Gills white, about 3 per mm., 1-1.5 mm. wide, adnate to free. Stem 4-7 cm. long, 0.5 mm. thick, brown, tough, covered with pale brown hair. In groups, attached to twigs and leaves in coniferous and mixed woods.

14. COLLYBIA VELUTIPES. Edible. Cap 2-6 cm. wide, convex to flat, sometimes the center depressed, surface tan to reddish brown, paler toward the margin, at first sticky, margin curved down. Flesh pale tan to white, thin. Gills 20-25 per cm., adnexed or toothed near the stem, white to pale tan, edge fringed when seen with a lens. Stem 3-10 cm. long, 3-10 mm. thick, curved, pale yellow when young, later the upper part pale tan, the lower portion covered with dense, velvety, reddish brown hairs, usually a number of stems arising from a common short-rooting structure. In clumps on living hardwood trees and on logs and stumps.

Genus HYGROPHORUS

The genus is supposed to be characterized by "waxy" gills, an ambiguous term. The gills of most species are rather translucent, thickened toward the base so that in section they appear more triangular than those of most other fungi, usually they are somewhat far apart, connected with one another by veins where they are attached to the cap, and brittle in texture. In old specimens the surface of the gills sometimes becomes gelatinous and can be rubbed off easily. The stem is hollow at maturity, often twisted, and splits lengthwise readily. No species are known to be poisonous.

Key to Species of Hygrophorus

1. Gills white - - 2
Gills colored (yellow, green, orange, red, or brown) - - 5
2. Cap white - - *H. eburneus*
Cap not white - - 3
3. Cap conical, yellow or red - - *H. conicus*
Cap convex - - 4
4. Cap pale pink to red - - *H. russula*
Cap tan, sometimes with a tinge of pink
- - *H. pudorinus*
Cap pale yellow in the center, covered with minute yellow dots near the margin
- - *H. chrysodon*
5. Cap not sticky (dry specimens must be moistened thoroughly to determine this) - - 6
Cap sticky - - 7

6. Cap 1-4 cm. wide, red or orange - - *H. miniatus*
Cap 3-9 cm. wide, reddish brown or tan
- - *H. pratensis*
7. Cap conical, yellow or red - - *H. conicus*
Cap not conical - - 8
8. Cap 3-10 cm. wide, bright red when young, pale
red when old - - *H. puniceus*
Cap 1-4 cm. wide - - 9
9. Cap green when young, later dull red, brown or
yellow - - *H. psitticinus*
Cap yellow or golden orange - - *H. cerasius*

Description of Species of *Hygrophorus*

1. *HYGROPHORUS CERASIUS*. Cap 1-2 cm. wide, convex,
surface smooth, yellow
to golden orange, sticky, translucent toward the
margin where the gills show through as striations.
Flesh 1-2 mm. thick, yellow or orange, the trans-
lucent surface layer easily seen when the cap is
split. Gills about 20 per cm. at the margin, 2-4
mm. wide, widest midway between margin and stem,
adnate or short decurrent, yellow, edge delicately
toothed. Stem 2-3 cm. long, 4-6 mm. thick, flat,
hollow, yellow, fibrous, easily split lengthwise,
very pale yellow inside. Scattered on grassy ground.
2. *HYGROPHORUS CHRYSODON*. Edible. Cap 3-7 cm.
wide, first almost hemi-
spherical, later convex to flat, margin inrolled
when young, the surface white with a light yellow
center, covered with minute yellow dots that are
more numerous near the margin, very sticky when
moist. Flesh white. Fills 8-10 per cm., 4-8 mm.
wide, decurrent, white, prominent veins between
them. Stem 5-10 cm. long, 5-10 mm. thick, white,
dotted with yellow like the cap. Solitary or scat-

tered on the ground in open stands of hardwood trees.

3. *HYGROPHORUS CONICUS*. Cap 2-4 cm. wide, at first acutely conical, later conical to campanulate or the margin upturned, often split from the margin to the stem, surface golden yellow, orange, or red, often becoming black in overmature specimens or where bruised, sticky when young and fresh. Gills 10-15 per cm., 5-15 mm. wide, pale to bright yellow, triangular in cross section, close, almost free. Stem 3-10 cm. long, 4-8 mm. thick, uniform in diameter, prominently ridged and twisted, pale to bright yellow, black in age or where bruised, fibrous, brittle. Solitary or scattered, often in large numbers, on the ground in woods.

4. *HYGROPHORUS EBURNEUS*. Cap 4-9 cm. wide, umbonate when young, flat or shallow funnel shape when mature, white or ivory color, sticky when young and fresh. The surface of old, dry specimens becomes mucilaginous when moistened, and this mucilaginous cuticle can be peeled off in patches. Flesh white, 6-10 mm. thick near the stem, almost disappearing half the way to the margin, fibrous. Gills 10-15 per cm. at the margin, 6-10 mm. wide at the widest place, decurrent, thick, sometimes forked, white or pale yellow, with veins between them where they are attached to the cap. Stem 1-2 cm. thick at the top, 5-10 cm. long, tapering downward, for a centimeter or two below the gills it is covered with little white tufts, and from there down it is pale yellow and sticky. The interior of the stem is fibrous and white or pale yellow. Scattered or in groups of 2 or 3 on the ground in deciduous woods.

5. *HYGROPHORUS MINIATUS*. Cap 1-4 cm. wide, slightly convex or flat, sometimes with a hollow in the center extending down into the stem, vermilion to orange, not sticky, pubescent or delicately scaly, margin often regularly cracked and somewhat wavy. Flesh pale, thin. Gills 10-12 per cm., 3-6 mm. wide, adnate or short decurrent, colored like the cap or paler. Stem 2-7 cm. long, 2-5 mm. thick, colored like the cap or yellow. Solitary or in groups on the ground or on very rotten wood, occasionally on old white pine stumps.
6. *HYGROPHORUS PRATENSIS*. Edible. Cap 3-9 cm. wide, convex to flat, sometimes with a broad, high umbo, reddish brown when young, fading to pale tan, translucent and watersoaked when moist, not sticky. Flesh pale tan. Gills 8-12 per cm., 4-10 mm. wide, decurrent, colored like the cap or paler. Stem 3-7 cm. long, 8-15 mm. thick, usually tapering downward, colored like the cap or almost white. Solitary or in groups or clumps, sometimes in rings, on the ground in open deciduous woods and meadows.
7. *HYGROPHORUS PSITTICINUS*. Cap 2-4 cm. wide, campanulate when young later flat, depressed in the center, sticky when moist, surface first rather bright green, often changing to dull red, brown, or yellow, delicately striate. Gills 8-12 per cm., 3-6 cm. wide, adnate, dull green to red or yellow. Stem 4-7 cm. long, 2-5 mm. wide, green toward the top, red to yellow below, sticky, tough. Scattered or in groups on the ground in low swampy woods or open places.
8. *HYGROPHORUS PUDORINUS*. Edible. Cap 4-12 cm. wide, convex or campanulate, surface sticky when moist, pale tan or slightly darker, often tinged with pink, margin at first inrolled and covered with delicate down. Flesh white or very pale pink. Gills 10-12 per cm. at the

margin, 3-8 mm. wide, short decurrent, occasionally forked, intervenose, white. Stem 3-8 cm. long, 0.5-2 cm. thick, often tapering downward, white to tan, sometimes with a tinge of pink, slightly hairy, roughened toward the top. Scattered or in groups on the ground in coniferous woods.

9. *HYGROPHORUS PUNICEUS*. Edible. Cap 3-10 cm. wide, campanulate to convex when young, flat to depressed in the center when old, sticky when moist, bright scarlet, fading in age to pale red or orange, the margin lobed or wavy. Gills 10-12 per cm. at the margin, 5-12 mm. wide, narrowly adnexed to decurrent, scarlet or yellow, prominent veins between the gills where they are attached to the cap. Stem 5-8 cm. long, 5-20 mm. wide, reddish yellow toward the top, the base white, fibrous, striate, hollow. Solitary or scattered on the ground in woods and open places.

10. *HYGROPHORUS RUSSULA*. Edible. Cap 6-12 cm. wide, convex when young, becoming broad and shallow funnel shape, surface pale pink to red, sticky when moist, often spotted with minute scales, margin first inrolled, then raised and lobed or wavy. Gills 8-12 per cm., 5-14 mm. wide, adnexed to short decurrent, white when young, irregularly spotted with red when old. Stem 3-7 cm. long, 1.5-2.5 cm. thick at the top, tapering downward, white, covered with downy mycelium. Solitary or caespitose, often in large groups on the ground in deciduous woods.

Genus LACTARIUS

The genus is characterized by white spores, gills adnate or short decurrent, flesh of cap and stem very brittle like that of *Russula*, to which it is closely related. The flesh and gills of fresh specimens when broken exude a white or colored juice, which is the single critical distinguishing character of the genus; the quantity of this juice varies according to the species and the weather, and sometimes is so scanty that it can be detected only with the aid of a lens, but ordinarily it is sufficiently obvious to be seen readily. Gussow and Odell in "Mushrooms and Toadstools" report that several species previously considered poisonous because of their unpleasant taste when fresh actually are edible and delicious, the objectionable flavor disappearing when the mushrooms are cooked.

Key to Species of Lactarius

1. Milk and entire plant indigo blue - - *L. indigo*
Milk first white, soon becoming violet
- - *L. uvidus*
Milk first white, soon pale yellow, then fading
to white - - *L. cilicioides*
Milk first white, soon becoming sulphur yellow
and remaining so - - *L. chrysorheus*
Milk yellow or orange - - 2
Milk white and remaining so - - 3
2. Milk orange - - *L. deliciosus*
Milk cream colored to yellow - - *L. trivialis*
3. Entire plant abortive and very irregular in
shape, bright orange red, gills only partially
formed, cap and gills white inside
- - *Hypomyces lactifluorum*
Cap normal, surface sticky when moist - - 4

- Cap normal, surface not sticky - - 8
4. Gills pale pink - - *L. controversus*
Gills not pink - - 5
5. Margin hairy, cap tan to reddish tan, often
zoned - - *L. torminosus*
Margin not hairy - - 6
6. Surface with concentric bands of orange to copper color - - *L. insulsus*
Surface without concentric bands of color - - 7
7. Surface pale gray to grayish brown, sometimes
with a violet tinge - - *L. trivialis*
Surface pale yellow to pale orange - - *L. affinis*
8. Entire surface densely covered with short hair
- - *L. vellerius*
Only the margin hairy - - *L. deceptivus*
Surface glabrous - - 9
9. Surface white - - *L. piperatus*
Surface brown - - 10
10. Cap 2-5 cm. wide - - *L. subdulcis*
Cap 5-12 cm. wide - - *L. volemus*

Description of Species of *Lactarius*

1. *LACTARIUS AFFINIS*. Cap 6-12 cm. wide, first convex with a central depression and the margin inrolled, later broad funnel shape and the margin curved down; surface yellowish tan to pale orange, without zones, sticky when moist. Flesh 8-12 mm. thick near the stem, white, firm, exuding a very bitter white juice when broken. Gills about 15 per cm., 6-8 mm. wide midway between the stem and the margin, tapering to points at both ends, short decurrent, pale yellow or cream colored, many

gills branched at the very base. Stem 8-12 cm. long, 1.5-2.5 cm. thick at the top, tapering gradually up or down or quite cylindrical, the base covered with white mycelium, solid until eaten out by larvae. Solitary or scattered on the ground in mixed conifer and hardwoods.

2. *LACTARIUS CILICIOIDES*. Cap 7-14 cm. wide, depressed in the center, the margin first inrolled, later upraised, surface white or tan and white, sticky, covered with matted hairs, especially on the margin, or sometimes only the margin hairy. Flesh white, 8-10 mm. thick near the stem, becoming gradually thinner toward the margin, juice scanty, first white, becoming pale yellow almost at once and in a few minutes becoming colorless again, slightly bitter or tasteless. Gills 12-18 per cm., 3-5 mm. wide, white, exuding juice more copiously than the flesh, the yellow color of the juice often being most apparent just at the junction of gills and cap, short decurrent, occasionally forked near the stem, many gills near the margin 1 cm. or less in length. Stem 3-5 cm. long, 1.5-3 cm. thick white. Solitary or scattered on the ground, chiefly in coniferous woods.

3. *LACTARIUS CHRYSORHEUS*. Said to be poisonous. Cap 4-10 cm. wide, convex with a broad depression in the center, or wide funnel shape, margin first inrolled, later elevated; surface pale yellow, pale orange or pale red, often with concentric zones of alternate yellow and orange, dry or slightly sticky, margin pubescent. Flesh at first white, later pale yellow; juice white, changing to sulphur yellow, abundant, very bitter. Gills 20-25 per cm., 3-5 mm. wide, adnate to short decurrent, infrequently forked near the stem, white when young, later yellow. Stem 4-6 cm. long, 1-1.5 cm. thick, hollow when mature, white or colored like the cap, sometimes spotted, often pubescent. Gregarious or in small clumps, on the ground in

deciduous woods.

4. *LACTARIUS CONTROVERSUS*. Cap 8-16 cm. wide, broad funnel shape, surface white when dry, when moist watersoaked pale tan and very sticky, usually with several narrow zones near the margin, often with numerous reddish brown blotches although these are not invariably present; margin at first inrolled, later upraised. Flesh 8-15 mm. thick, white, firm, of uniform thickness almost to the margin. Gills 15-20 per cm. at the margin, 3-5 mm. wide, narrowed to a point at the stem, short decurrent in old specimens, white when young, soon pink. Juice white, opaque, fairly abundant in moist weather, peppery a short time after tasting. Stem 2-4 cm. long, 1-3 cm. thick at the top, usually tapering downward and frequently with a lateral "root" at the base made up of soil and mycelium. On a dry day the cap is not sticky, but leaves and other debris adhering to it are evidence that it was sticky when it emerged.
5. *LACTARIUS DECEPTIVUS*. Edible. Cap 8-15 cm. wide, flat with a depressed center or broad funnel shape, margin first inrolled, later upraised; surface dry, white or grayish tan, often with irregular brown spots, glabrous except the margin which is covered with dense short hair. Flesh white. Juice white, not changing color, bitter. Gills 12-15 per cm., 6-12 mm. wide, adnate to short decurrent, white or pale yellow, rarely forked. Stem 3-8 cm. long, 1-4 cm. thick, solid, often tapering downward, delicately hairy, white. Scattered or gregarious on the ground in conifer or hardwoods.
6. *LACTARIUS DELICIOSUS*. Edible. Cap 6-12 cm. wide, convex with a central depression and incurved margin when young, later broad funnel shape and the margin upraised; surface pale orange when young, fading to grayish orange or

pale tan, usually with alternate lighter and darker zones of color although these may be indistinct or lacking, becoming green where bruised. Flesh white to orange, tinged green near the stem, 8-10 mm. thick at the stem. Juice yellow to orange. Gills 15-20 per cm. at the margin, 5-8 mm. wide, adnate or short decurrent, occasionally forked, inconspicuous veins between the gills where the gills join the cap, reddish orange, becoming green when bruised or in age. Stem 4-8 cm. long, 1-2.5 cm. thick, cylindrical, delicately pubescent when young, orange or with orange spots, becoming green where bruised or in age, hollow when mature. Scattered on the ground in forests.

7. *LACTARIUS INDIGO*. Edible. Cap 5-15 cm. wide, convex with a central depression or broad funnel shape, margin curved down; surface indigo blue with a silvery sheen, with alternate lighter and darker blue zones. Flesh indigo blue, 1-2 cm. thick near the stem. Juice usually abundant, blue, mild in taste. Gills 15 per cm., 5-10 mm. wide, adnate to short decurrent, occasionally forked, blue-green to pale green. Stem 2-6 cm. long, 1-3 cm. thick, equal in diameter or tapering toward the base, blue, hollow at maturity. Solitary or scattered on the ground in mixed woods.

8. *LACTARIUS INSULSUS*. Cap 5-10 cm. wide, first convex with a central depression, later broad funnel shape, margin inrolled when young, decurved to upraised when old; surface copper colored to orange, with alternate zones of lighter and darker color, sticky when moist. Flesh white. Juice white, very bitter. Gills 20 per cm., 4-8 mm. wide, adnate when young, later short decurrent, occasionally forked near the base, white or grayish white. Stem 2-5 cm. long, 8-15 mm. thick, cylindrical or tapering slightly downward, paler than the cap, hollow at maturity. Scattered in groups or in clumps on the ground in open deciduous woods.

9. *LACTARIUS PIPERATUS*. Edible. Cap 6-12 cm.
wide, plane with a depressed center or broad funnel shape, margin first incurved, later elevated; surface white, without zones, dry, glabrous. Juice white, abundant, very peppery. Gills 20-25 per cm., at the margin, 3-6 mm. wide, adnate or short decurrent, repeatedly forked, white or pale yellow. Stem 2-6 cm. long, 1-3 cm. thick, often tapering downward, white, sometimes finely pubescent. Scattered or gregarious on the ground in deciduous woods. Gussow and Odell, in "Mushrooms and Toadstools" describe a variety, pergamenus, in which the gills are 15 per cm. and seldom forked and with the stem more slender, and another variety has been described in which the juice changes to pale yellow.

10. *LACTARIUS SUBDULCIS*. Edible. Cap 2-5 cm.
wide, convex or flat when young, depressed in the center when mature, margin of young plants not inrolled; surface tan to reddish brown, without zones, dry. Flesh pale tan. Juice scanty in dry weather, abundant in moist weather, white, tasteless or slightly bitter. Gills 15-20 per cm., 2-5 mm. wide, adnate or short decurrent, occasionally forked, somewhat paler than the cap, often stained reddish. Stem 4-7 cm. long, 3-8 mm. thick, colored like the cap or paler, sometimes hairy toward the base, hollow when mature. Scattered or in groups on the ground in deciduous woods and grassy fields.

11. *LACTARIUS TORMINOSUS*. Edible. Cap 5-10 cm.
wide, broad funnel shape, margin first inrolled, later decurved; surface pale reddish tan, often with alternate zones of tan and reddish tan, sticky when moist, hairy on the margin. Flesh white or pale red. Juice white, very bitter. Gills 20 per cm., 3-6 mm. wide, short decurrent, some forked near the stem, white or pale yellow when young, later with a reddish tinge. Stem 3-6 cm.

long, 1.5-2 cm. thick, sometimes tapering downward, pale red to almost white, often spotted. Scattered or in groups on the ground in deciduous and mixed forests. Kauffman's "Agaricaceae of Michigan" lists this species as poisonous, but Gussow and Odell, in "Mushrooms and Toadstools" state: "To our personal knowledge the species has been eaten and enjoyed without causing any trouble."

12. *LACTARIUS TRIVIALIS*. Edibility doubtful. Cap 7-15 cm. wide, first convex, later almost flat with a slight depression in the center, margin inrolled when young and remaining so or at least curved downward; surface pale or dark gray, grayish brown or with a tinge of violet or pink, without zones, glabrous, sticky when moist. Flesh 6-15 mm. thick, soft and fragile, white or pale gray, grayish brown near the surface of the cap. Juice abundant, white to pale yellow, very bitter 20-30 seconds after tasting, although this bitterness may be lacking in old specimens. Gills about 20 per cm. at the margin, 5-10 mm. wide, adnate or short decurrent, often forked near the stem, white or pale tan, sometimes with a greenish tinge where bruised. Stem 4-10 cm. long, 1-2 cm. thick, cylindrical, white or pale gray, glabrous, hollow when mature. Scattered or gregarious on the ground in deciduous and coniferous woods.

13. *LACTARIUS UVIDUS*. Said to be poisonous. Cap 4-8 cm. wide, first obtuse with inrolled margin, later flat, at maturity with a shallow depression in the center and decurved margin; surface pale brown or watersoaked tan with a tinge of lavender, sticky. Flesh 8-12 mm. thick at the stem, 1 mm. at the margin, white when freshly cut or broken, soon becoming violet. Gills 12-15 per cm., the larger ones 6-8 mm. wide, many short gills only 1 mm. or less wide and a few mm. long, the larger ones tapered toward both ends, white, pale purple where bruised, short decurrent, some-

times forked near the stem. Juice white, soon becoming violet, abundant in young specimens. Stem 4-5 cm. long, 1-2 cm. thick at the top, tapering slightly downward, with a narrow hollow up the center, both inside and outside becoming purple where cut or bruised. In groups on the ground in swampy woods.

14. *LACTARIUS VELLERIUS*. Edible. Cap 6-12 cm. wide, convex with the center depressed, margin first inrolled, later upraised; surface white or gray, covered with dense short hair which in young specimens may be matted together. Flesh 4-8 mm. thick near the stem, white. Juice abundant in moist weather, scanty to lacking entirely in dry weather, white, very peppery. Gills 10-15 per cm. at the margin, 4-8 mm. wide, adnate or short decurrent, white to pale yellow, sometimes becoming brown where bruised, occasionally forked. Stem 2-4 cm. long, 1-2 cm. thick, often tapering downward, white, solid, densely covered with short hair or glabrous. Scattered to gregarious on the ground in deciduous or mixed woods. Kauffman states that this species is suspected of being poisonous, but Gussow and Odell in "Mushrooms and Toadstools" consider it edible.

15. *LACTARIUS VOLEMUS*. Edible. Cap 5-12 cm. wide, convex to flat or depressed in the center, margin first inrolled, then decurved or flat; surface golden brown or darker, without zones, glabrous, often wrinkled. Flesh white or pale tan. Juice usually abundant, white, mild in taste. Gills about 20 per cm., 5-10 mm. wide, adnate or short decurrent, occasionally forked, white or pale brown, darker in age or where bruised. Stem 3-10 cm. long, 1-2 cm. thick, colored like the cap or paler, usually solid, cylindrical. Scattered or in groups on the ground in deciduous woods and open spaces.

16. HYPOMYCES LACTIFLUORUM. Not poisonous, but not recommended for eating. This plant is a combination of two different fungi; Hypomyces lactifluorum is an Ascomycete which grows as a parasite on gilled fungi. In some regions of the country the gilled fungus that serves as a host is Lactarius piperatus, described above. The writer, however, has found it in northern Minnesota and Wisconsin almost only on Russula delica. Both of these host fungi, Lactarius piperatus and Russula delica, are edible, but the parasite Hypomyces lactifluorum may grow on still other gilled fungi, and since the host on which it grows ordinarily is distorted and unidentifiable with certainty, one probably should avoid eating the plants. The writer and others have eaten these plants at Itasca Park in Minnesota, and while none of us were poisoned we all had rather pronounced intestinal symptoms within the next 12 hours, and the flavor of the plants was not such as to recommend them highly. The plants vary greatly in shape and size, and therefore only a general description can be given - however, the bright orange red color and the aborted gills on the under side of the cap usually serve to identify them.

Cap 5-12 cm. wide, irregularly globose, flat, convex, with margin downcurved or upraised, entire plant orange or orange red in color. This bright color is restricted to a thin layer on the outside, the interior of the plant being white, the texture of the flesh of cap and stem usually firm and brittle. Where the gills ordinarily would be, on the under side of the cap, there may be only suggestions of gills, but if the cap is broken to expose a section of this surface, hints of gills usually can be seen. Stem 2-4 cm. thick, 4-10 cm. long, or the cap merely tapering to a thick stem-like base.

Genus LENTINUS

The genus is characterized by white spores, and by the rather prominently toothed lower edges of the gills. The flesh of the cap is tough, and the fruit bodies endure for a week or more, shrinking in dry weather and reviving with rain. All of the four species here described are found on wood. In habit and appearance Lentinus and Panus are rather similar and some authorities have included them in a single genus.

Key to Species of Lentinus

1. Stem absent, caps attached laterally, usually imbricate - - *L. vulpinus*
Stem present, central or eccentric - - 2
2. Caespitose, with many stems joined near the base, cap funnel shaped - - *L. cochleatus*
Scattered or in groups, stems of adjacent plants not joined - - 3
3. Cap 4-12 cm. wide, obtuse to flat, pale yellow or tan, scaly - - *L. lepideus*
Cap 2-5 cm. wide, flat or depressed in the center, center covered with dark brown, hairy scales - - *L. tigrinus*

Description of Species of Lentinus

1. LENTINUS COCHLEATUS. Edible. Cap 3-7 cm. wide, narrow to broad funnel shape, margin lobed and very irregular in outline, often distorted from mutual pressure, curved down; surface tan to reddish brown, almost glabrous or covered with short erect scales, often radially cracked or furrowed. Gills 15-20 per cm. at the

margin, 4-8 mm. wide, long decurrent, tough, edge saw-toothed, white or pale flesh color. Stem 3-7 cm. long, 5-10 mm. in diameter, central to eccentric, tough, solid, tapering downward, irregularly furrowed, many stems joined near the base, flesh colored at the top, reddish brown at the base. In dense clumps on stumps and decaying logs of deciduous trees.

2. *LENTINUS LEPIDEUS*. Edible. Cap 4-12 cm. wide, first convex, later almost flat, surface white to pale brown, toward the center covered with coarse brown flat scales, often with conspicuous cracks extending in from the margin through the entire flesh of the cap. Flesh white, tough, up to 2 cm. thick. Gills about 20 per cm. at the margin, 5-12 mm. wide, sinuate or decurrent, white or yellow, conspicuously and irregularly sawtoothed on the lower edge. Stem 2-7 cm. long, 1-2 cm. thick at the top, usually rough and scaly, white or pale yellow, tough, solid. Singly or 2 to 3 fruit bodies together on decaying conifer logs, posts, stumps, railroad ties, dock and bridge timbers, etc. A veil is present in young specimens, and sometimes this remains near the top of the stem as a ring. The plant has a definite odor suggestive of licorice.

3. *LENTINUS TIGRINUS*. Cap 2-5 cm. wide, first convex, later flat, with a narrow depression in the center, tough and leathery; surface covered with dark brown or black hairy scales; in overmature specimens the margin may be wavy or upraised and split. Flesh white, 2-3 mm. thick, tough. Gills 20 per cm. at the margin, 2-4 mm. wide, decurrent, white, edge toothed. Stem 1-3 cm. long, 3-5 mm. thick, solid, white or tan, often covered with small scales. Sometimes an annulus or ring is present, but usually disappears quickly. Kauffman in "Agaricaceae of Michigan" describes a "monstrous" form in which the gills do not develop,

and which he says is fairly common.

4. *LENTINUS VULPINUS*. Cap 4-10 cm. wide, ranging from almost circular to semicircular or irregular at the margin, tapering to a stemlike base, often numerous caps arising from a common point of attachment on the under side of a log; surface pale tan, coarsely hairy near the point of attachment, slightly or prominently radially furrowed toward the margin; margin curved down or inrolled. Flesh 1-2 mm. thick near the base, thinner at the margin, tough, white. Gills 20 per cm. at the margin, white to pale tan, edge coarsely sawtoothed, radiating from the stemlike base. Usually in clusters of several to many fruit bodies arising from the same point. It has a very peppery taste when chewed. On logs and stumps of hardwood trees.

Genus *LENZITES*

The genus is distinguished by white spores, and tough and stemless fruit bodies that have a broad base of attachment like many of the Polypores. The fruit bodies do not decay readily but persist for some time, and it is not unusual to find, in the spring and early summer of one year, fruit bodies that were formed the previous year. *Lenzites* appears to form a connecting link between the gill fungi and the pore fungi, and the genus commonly is placed in both the Agaricaceae, or gill fungi, and the Polyporaceae, or pore fungi. The 3 species here described, all of which are almost world wide in distribution and all of which are common on decaying wood, are the major species in the genus.

1. *LENZITES BETULINA*. Fruit body 3-6 cm. wide, projecting from the base 2-4 cm., sessile or effuse reglexed, circular and resupinate when growing on the under side of a log,

typically semicircular when growing from the side of a log, flat; the surface woolly when fresh, with many narrow concentric ridges and bands of color, alternating pale gray, yellow, and brownish orange when fresh, fading to dirty gray, margin usually thin. Flesh or context white, corky, firm but somewhat flexible when dry, 1-3 mm. thick. Gills at first white, weathering to dirty gray, about 10 per cm. at the margin, up to 2 mm. thick, firm, leathery or tough. In groups and clumps on decaying branches, logs and stumps of birch.

2. LENZITES SEPIARIA. Cap or pileus 2-7 cm. wide, projecting from the wood 1-4 cm. usually shelflike, sometimes with a stemlike base; surface at first woolly and yellowish or reddish brown, or alternate bands of dark and lighter reddish brown; often the most recent zone of growth of a fresh specimen is yellowish brown, while the older portion is darker; often the surface has concentric ridges, and in fresh specimens the surface has a hairy covering but this disappears with weathering. Context brown, tough and pliable when fresh, corky when old or dry, 1-5 mm. thick. Gills 10-15 per cm. at the margin, 3-8 mm. wide, thick, the edges of fresh specimens often yellowish with darker mycelium below, so that the slightest bruise or scratch exposes the darker mycelium. Solitary or scattered on decaying conifer logs and conifer wood. This fungus is a common cause of decay in coniferous construction timber of all kinds, from railroad ties and bridge timbers to boats and buildings, where the wood is occasionally moist and has not been protected by a preservative.

3. LENZITES TRABEA. Fruit bodies sometimes solitary, usually in groups of 2 to 5, shelflike, each shelf approximately semicircular in outline, 1-2 cm. wide, extending out from the wood 0.5-3 cm., 5-10 mm. thick at the base, margin thin and sharp; upper surface cinnamon brown

to gray brown when dry, chocolate brown when moist, when young and fresh covered with woolly matted mycelium which soon disappears leaving the surface smooth, often with several indistinct ridges. Context or flesh 2-3 mm. thick, colored like the upper surface, firm. Pores 10-20 per cm. in a tangential direction, often radially elongate, especially near the margin. Single pores that are much longer than others in a radial direction are irregularly distributed among the other pores of more or less uniform size. The pores are 2-3 mm. long, the walls and lower ends gray when dry, the lower ends brown when fresh and moist. Singly, scattered and in groups on dead hardwoods and conifers, especially on posts and poles. It is one of the principal causes of "shell-rot" of telephone poles and of decay of wood in many kinds of construction.

Genus LEPIOTA

The genus is characterized by white spores, free gills, a ring on the stem, and the stem separating readily from the cap, such definite characters that ordinarily this is one of the easiest genera to recognize. Most of the species that have been tested are edible, but the edibility of some is not known. One species, *L. morgani*, is poisonous, causing mild to serious illness but rarely death; it is especially dangerous because closely resembles and can easily be mistaken for some of the edible kinds.

Key to Species of Lepiota

1. Surface of mature cap smooth - - 2
Surface of mature cap scaly - - 5
2. Cap white - - 3
Cap tan to dark reddish brown - - 4

-
3. Ring prominent, cap 4-10 cm. wide - - *L. naucina*
Ring soon disappearing, plants growing in dense
clumps - - *L. cepaestipes*
 4. Cap dark reddish brown, very sticky when young
and fresh (old dry specimens must be kept
wet for some time to determine this)
- - *glioderma*
Cap pale tan to pale brown, dry and wrinkled
- - *L. granulosa*
 5. Spores and gills of mature plant green
- - *L. morgani*
Spores and gills of mature plant white - - 6
 6. Flesh becoming red in old plants or when bruised
- - *L. americana*
Flesh not becoming red - - 7
 7. Scales on mature cap erect and pointed - - 8
Scales on mature cap flat or nearly so - - 9
 8. Cap 5-12 cm. wide - - *L. acutesquamosa*
Cap 3-5 cm. wide - - *A. asperula*
 9. Ring prominent and persisten - - 10
Ring soon disappearing - - 12
 10. Edge of cap and ring red - - *L. rubrotincta*
Edge of can and ring not red - - 11
 11. Stem 15-30 cm. long, ring usually can be moved
up and down - - *L. procera*
Stem 8-20 cm. long, ring not movable
- - *L. rachodes* (see also *L. morgani*)
 12. Stem smooth and shiny - - *L. cristata*
Stem covered with shreds of mycelium or fluffy
scales - - 13

13. Growing in dense clumps on manured ground
- - *L. cepaestipes*
Scattered or in groups of 2 or 3 in the forest
- - *L. clypeolaria*

Description of Species of *Lepiota*

1. *LEPIOTA ACUTESQUAMOSA*. Cap 5-12 cm. wide, first hemispherical, later convex to flat; surface at first densely and uniformly covered with pale brown hairs which as the cap expands form erect pointed brown scales that are more crowded near the center; the margin radially cracked and extending beyond the end of the gills. Flesh white. Gills 20-25 per cm., 4-7 mm. wide, free, white or pale gray, edge delicately serrate. Stem 6-12 cm. long, 6-12 mm. thick at the top, tapering upward, the base enlarged or bulbous, with few scattered brown scales below the annulus. Annulus rather delicate and often disappearing quickly. Scattered or in groups on the ground and on very rotten wood, sometimes in yards and gardens.

2. *LEPIOTA AMERICANA*. Cap 8-20 cm. wide, oval or bell shaped when young, later convex or campanulate; margin first incurved, sometimes slightly striate in age; surface of young plants covered with a continuous reddish brown skin which, as the cap expands, breaks up first into irregular rings, then forms large scales. Flesh 1-2 cm. thick at the stem, very thin at the margin, white when young, turning pale red in age or when bruised; in young specimens this red color is very deep and appears within a few seconds after the flesh is broken, but in older specimens the color is rather pale and appears slowly. Gills 15 per cm., at the margin, 6-12 mm. wide, free, white, becoming red when bruised. Stem 10-25 cm. long, 8-20 mm. thick at the top, enlarged at the base or enlarged just above the ground line and tapering both up and

down from there, solid when young, hollow at maturity, becoming reddish brown in age or when bruised. Ring large, white, soft and pendulous, occasionally movable, sometimes disappearing quickly. Solitary or in clumps on the ground in pastures and in woods.

3. *LEPIOTA ASPERULA*. Cap 3-5 cm. wide, convex, first uniformly reddish brown or orange brown but as the cap expands the cuticle breaks up into very numerous, small, erect scales that are very dense toward the center; surface between the scales pale yellowish brown. Small white fragments of the veil hang from the margin of the cap as it expands but these soon disappear. Flesh white or pale tan, 4-7 mm. thick near the stem, spongy, brittle. Gills 35-45 per cm. at the margin, 3-5 mm. wide, free, first white, soon pale yellow. Stem 2-6 cm. long, 4-8 mm. thick, solid, fibrous, scaly like the cap up to the ring, pale yellow or pale reddish brown above the ring; ring soon disappearing. Solitary or in groups of a few.

4. *LEPIOTA CEPHAESTIPES*. Cap 2-4 cm. wide, oval when young, broad conical when mature, white, at first covered with loose, mealy mycelium most of which wears off. Flesh about 2 mm. thick near the stem, very soft and limp. Gills 3-5 mm. wide, 20-25 per cm. at the margin, white, free. Stem 5-8 cm. long, 2-4 mm. thick at the top, increasing in diameter toward the base, the base enlarged in a peculiar way like the bulb of a young onion, covered below the ring with a layer of mealy white mycelium that rubs off easily. The ring is thin and soon dries up and disappears. In dense clumps, with 5 to 15 fruit bodies in each clump, sometimes in partial fairy rings, on rich soil or freshly manured ground.

5. *LEPIOTA CLYPEOLARIA*. Cap 3-8 cm. wide, campanulate or flat with an umbo, surface pale reddish brown and breaking up into numerous small scales except at the umbo, which is darker, often radially striate or cracked near the margin. Pieces of the veil remain attached to the margin as the cap expands. Flesh white, thin. Gills 12-18 per cm. at the margin, 3-6 mm. wide, free, white, edge fringed when viewed with a lens. Stem 4-10 cm. long, 3-7 mm. thick at the top, tapering gradually upward, covered with loose, pale brown scales up to the ring, white above the ring, hollow. Ring thin, delicate and soon disappearing. Solitary or scattered on the ground in conifer or mixed woods.
6. *LEPIOTA CRISTATA*. Edible. Cap 2-4 cm. wide, convex to campanulate, or flat with an umbo, surface at first dull red or reddish brown, breaking into concentrically arranged small scales as the cap expands, umbo remaining tan to brown. The scales are small or entirely absent toward the margin. Flesh thin, white. Gills about 20 per cm. at the margin, 2-4 mm. wide, free, white, sometimes forked near the stem, edge delicately wavy. Stem 3-5 cm. long, 2-5 mm. thick, usually white when young, often tinged pale pink or reddish brown when old, smooth or covered with loose silky mycelium up to the annulus, hollow or the interior spongy. Annulus small, inconspicuous, white, soon disappearing. Scattered or in groups on the ground in grassy places and forests.
7. *LEPIOTA GLIODERMA*. Cap 4-8 cm. wide, convex to flat, reddish brown, very gelatinous sticky when moist, smooth and shiny when dry, the skin removable, margin usually curved down. Flesh 3-5 mm. thick at the stem, pale tan, usually reddish where bruised, spongy. Gills white, pale yellow in age, 20-25 per cm. at the margin, 4-7 mm. wide, narrowly adnexed or free, the edge often irregularly sawtoothed. Stem 6-9 cm. long, 5-8 mm.

thick, uniform in diameter, above the ring pale yellowish red and smooth, below the ring covered with irregular streaks and partial rings of reddish mycelium. Veil white or pale yellow each hypha separate and distinct to give a sort of cobweb texture; the ring disappearing almost at once or evident only as a red line around the upper portion of the stem. Single or in groups of 2 or 3 on the ground in conifer and mixed woods.

8. *LEPIOTA GRANULOSA*. Cap 3-6 cm. wide, convex or flat with a low umbo, surface light brown to reddish brown, having a somewhat granular texture and whitish sheen, often with radial wrinkles. Flesh thin, white or tinged red. Gills about 20 per cm. at the margin, 4-6 mm. wide, adnexed to almost free, rounded at the stem, white. Stem 2-5 cm. long, 4-8 mm. thick at the top, even or tapering upward, pale red and granular or scaly up to the ring, white above. Ring delicate, quickly disappearing. In groups and dense clumps on the ground in deciduous woods.

9. *LEPIOTA MORGANI*. Poisonous. Cap 10-30 cm. wide, at first oval or globose, later convex to flat; surface first covered with a continuous tan or brown cuticle which breaks up, as the cap expands, to form large irregular patchy scales. Flesh thick, white. Gills about 15 per cm. at the margin, 8-15 mm. wide, free and sometimes 4-5 mm. from the stem, white when young, usually becoming green in mature specimens. Stem 10-20 cm. long, 1-2 cm. thick at the top, tapering gradually upward from an enlarged base, white or pale tan, solid. Ring or annulus prominent, tough but soft, and in older specimens it can be moved up and down the stem. The spore print is dull green. In groups, often in large fairy rings on the ground in pastures and open woods. It is said to be eaten by some people without harm, but it is known to cause vomiting and even serious illness in others. It can be

distinguished from some of the edible kinds only by making a spore print, and since it sometimes grows with the edible kinds, even in the same fairy rings, one can see the need for making a spore print, for positive identification, of every single specimen that is to be eaten.

10. *LEPIOTA NAUCINA*. Edible. Cap 4-8 cm. wide, oval or globose when young, later convex to almost flat; surface smooth, white or light tan, sometimes irregularly and inconspicuously cracked but never scaly. Flesh white, thick, firm. Gills 15 per cm. at the margin, 5-10 mm. wide, free, white when young, slowly becoming pinkish, then light brown, edge delicately fringed. Stem 5-10 cm. long, 6-12 mm. thick at the top, tapering gradually upward from a bulbous base, white, hollow when mature. Ring prominent, firm, sticking straight out from the stem, sometimes loose so that it can be moved up and down the stem. Scattered or in groups on the ground in pastures, fields, parks and open woods.

11. *LEPIOTA PROCERA*. Edible. Cap 5-12 cm. wide, oval when young, later campanulate to convex or flat with an umbo; surface at first uniform reddish brown but as the cap expands breaking up into prominent concentrically arranged brown scales except on the umbo, sometimes with small white woolly scales between the large brown ones. Flesh thick, white. Gills about 15 per cm., 6-12 mm. wide, narrow toward the stem and wider toward the middle, free and rather distant from the stem, white when young, pale brown when old, edge delicately fringed. Stem 15-30 cm. long, 6-12 mm. thick at the top, tapering upward from a bulbous base, delicately scaly, usually hollow. Ring thick, prominent, white above, brown scales on the under side, capable of being moved up and down. Singly or scattered on the ground in pastures or open deciduous woods.

12. *LEPIOTA RACHODES*. Edible. Cap 9-16 cm. wide, at first nearly spherical, later convex to flat; surface layer at first brown, breaking up into concentrically arranged flat scales. Flesh 1-2 cm. thick near the stem, tapering gradually to the margin, soft and spongy, white, often becoming reddish brown where broken or bruised. Gills 14-16 per cm. at the margin, 8-12 mm. wide, at first white, later tinged yellow to pale brown, edge delicately toothed and sometimes definitely brown. Stem 8-18 cm. long, 12-20 mm. thick at the top, gradually increasing in diameter toward the base which is enlarged and almost spherical. In groups and fairy rings on the ground in pastures and open deciduous woods.

13. *LEPIOTA RUBROTINCTA*. Cap 3-8 cm. wide, obtuse to campanulate, at first uniform reddish brown or rust colored, later the colored surface breaking up into flat scales. Gills white free, 15-20 per cm. at the margin, 4-8 mm. wide, edge fringed when viewed with a lens. Stem 7-14 cm. long, 5-15 mm. thick at the top, tapering upward, rind cartilaginous, interior fibrous. Ring rather prominent, part of it attached to the stem like a collar, the remainder flaring out either above or below this collar, the edge rusty red. Singly or in groups on the ground in open hardwood forests.

Genus *MARASMIUS*

The genus is distinguished by white spores a rather tough texture, and the so-called "reviving" habit; that is, the plants shrivel and shrink in dry weather, but when moistened revive again and continue to shed spores. Some of them persist for a surprising length of time, at least for weeks and sometimes perhaps for several months.

Key to Species of *Marasmius*

1. Stem white or pale tan - - 2
Stem reddish brown toward the base or entirely so - - 2
2. Gills attached to a collar, cap radially striate or furrowed - - *M. olneyi*
Gills adnate to free, cap not striate - - *M. oreades*
3. Cap white or pale tan - - 4
Cap brown - - 5
4. Cap 5-12 mm. wide, hemispherical, with prominent radial furrows - - *M. rotula*
Cap 1-2.5 cm. wide, nearly flat, margin striate - - *M. delectans*
5. Cap with distinct radial furrows from the margin to the center - - *M. siccus*
Cap without radial furrows - - 6
6. Entire stem densely covered with short white hair - - *M. urens*
Stem hairy only at the very base - - *M. cohaerens*

Descriptions of Species of *Marasmius*

1. *MARASMIUS COHAERENS*. Cap 1-2.5 cm. wide, convex to flat, sometimes with an umbo, margin in old specimens often turned up and wavy; surface brown or reddish brown, fading to tan in age. Flesh 1-3 mm. thick near the stem, same color as the surface. Gills 15-20 per cm. at the margin, 1.5-3 mm. wide, adnate or sinuate, pale brown when young, reddish brown when mature, sometimes with inconspicuous veins between them. Stem 5-12 cm. long, 4-6 mm. thick, reddish brown, shiny,

hollow, the cap enlarged and paler, the base dark brown and covered with dense white hairs, several stems often joined near the base, the fused portion covered with white mycelium. Singly or in groups and clumps on the ground or on very rotten wood in deciduous woods.

2. *MARASMIUS DELECTANS*. Cap 1-4 cm. wide, almost flat, curved down a little at the margin; surface pale ivory when moist, white when dry, slightly or prominently furrowed from the margin almost to the center. Flesh white, about 1 mm. thick in the center of the cap but consisting of only a skin over the rest of the cap. Gills white, adnexed, 8-10 per cm. at the margin, 3-5 mm. wide at the widest place, usually with prominent veins connecting adjacent gills where they are attached to the cap. Stem 3-5 cm. long, 2-4 mm. thick at the top, tapering downward, top white for 1/2 to 1 cm. below the cap then becoming gradually dark brown, the very base covered with white mycelium, hollow, rather fragile. In groups on leaves in deciduous forests, the leaves often being bound together by mycelium from which fruit bodies arise.

3. *MARASMIUS OLNEYI*. Cap 1-1.5 cm. wide, first convex, later flat or the center depressed, surface pale reddish brown, glabrous, radially striate when young and moist, the striations in age deepening into prominent wrinkles. flesh thin, tough, same color as the cap. Gills 10-20 per cm., 1-2 mm. wide, attached to a collar near the stem, white, edge slightly wavy. Stem 2-4 cm. long, 1 mm. thick, enlarged at the top, hollow, white or pale gray, covered with fine short hair, extending a short distance into the material on which it grows. Scattered or in groups on fallen leaves and twigs in deciduous woods.

4. *MARASMIUS OREADES*. Edible. Cap 1.5-4 cm. wide, at first convex, later campanulate to flat, tan to nearly white, smooth. Flesh pale tan to white, fairly thick near the stem. Gills almost free, white or pale tan, usually rather distant from one another, often with veins between them, the long gills regularly interspersed with short ones, and these with still shorter ones. Stem 4-7 cm. long, 3-5 mm. thick, white or pale tan, tough, finely hairy. In groups, usually in rings or partial rings on grassy ground. It is one of the best of the edible mushrooms and can be preserved merely by drying.

5. *MARASMIUS RESINOSUS*. Cap 6-12 mm. wide, convex to shallow funnel shape, the center often depressed, the margin curved down; surface white, covered with short hair than can be seen only with a lens. The entire cap is soft and pliable, but tough. Flesh 1 mm. or less thick, white, tough. Gills 8-12 per cm. at the margin, 2-3 mm. wide, white, decurrent, usually with veins between adjacent ones where they join the cap. Stem 2-5 cm. long, about 1 mm. thick, gray, covered with short hair, tough, the base slightly enlarged. Usually in groups on wood and twigs in deciduous woods and groves.

6. *MARASMIUS ROTULA*. Cap 5-12 mm. wide, hemispherical, with a small depression in the center of the cap just above the point of attachment of the stem; surface white, with radial furrows extending from the center to the margin. Gills white, relatively distant from one another, attached to a collar or ring near the stem. Stem 2-5 cm. long, 1 mm. thick, hollow, shiny, dark brown or black, paler near the top, glabrous. Usually in groups of a few to several dozen specimens on leaf litter and on the bark of living hardwood trees.

7. *MARASMIUS SICCUS*. Cap 1-2.5 cm. wide, first conical, later campanulate; surface yellowish red to rose brown or rusty brown, darker in the center, distinct radial furrows extending from the center to the margin, glabrous. Flesh 1 mm. or less thick, tough and pliable. Gills 8-12 per cm. at the margin, 1-3 mm. wide near the margin, narrowed toward the stem, free or narrowly attached to the stem, white to pale reddish brown, frequently with inconspicuous veins on the sides and between them where they are attached to the cap. Stem 4-8 cm. long, 1-2 mm. thick, dark brown, almost white near the top, tough, hollow, base slightly hairy. Scattered or in groups on fallen leaves, twigs and decayed wood under coniferous and deciduous trees.

8. *MARASMIUS URENS*. Cap 2-5 cm. wide, first hemispherical, later campanulate to convex or flat, margin incurved when young; surface dark tan to reddish brown, first smooth, later wrinkled, glabrous. Flesh 2-4 mm. thick near the stem, white, tough and pliable. Gills 10-12 per cm., 2-4 mm. wide, free, with inconspicuous veins between them where they join the cap, white when young, tan or pale reddish brown in age. Stem 5-8 cm. long, 1-3 mm. thick, uniform in diameter, often curved, pale reddish brown, paler at the top and very dark brown at the base, densely covered with short white hair. Taste very bitter. Scattered or in groups on the ground in grassy places and deciduous woods.

Genus MYCENA

The genus has white spores and a rather characteristic shape of cap as shown in the drawings where the genus is listed. The margin of the cap is straight, not incurved, in young specimens, and the stem usually is fragile, hollow and with a rather brittle rind. Most species are so small that their

edibility has not been tested.

Key to Species of *Mycena*

1. Cap 4-10 mm. wide - - 2
Cap 1-4 cm. wide - - 3
2. Cap pure white, growing on the ground or on rotten wood - - *M. immaculata*
Cap black to grayish brown, on the bark of living trees - - *M. corticola*
Cap reddish brown in the center, yellow on the margin, growing on the ground
- - *M. subincarnata*
3. Growing on the ground - - 4
Growing on wood - - 5
4. Cap brown when moist, gray when dry
- - *M. atroalba*
Cap pale violet to pale pink - - *M. pura*
5. Cap, gills, and stem yellow to orange, cap with a sticky epidermis that can be peeled off
- - *M. leajana*
Cap and stem pale reddish brown, margin usually with wavy lobes - - *M. haematopa*
Cap brown in the center, pale tan toward the margin - - *M. galericulata*

Description of Species of *Mycena*

1. *MYCENA ATROALBA*. Cap 1-2.5 cm. wide, campanulate, or plane with an umbo, brown when moist, grayish when dry, radial striations extending from margin to umbo. Gills 10-15 per cm. at the margin, 2-4 mm. wide, narrowly adnexed, pale gray. Stem 4-6 cm. long, 1-2 mm. thick, brown almost to the cap, paler at the top, fragile, hollow,

covered with white mycelium at the base. Scattered or in groups on the ground in forests.

2. *MYCENA CORTICOLA*. Cap 4-10 mm. wide, hemispherical to convex, often with a small depression in the center, surface black to grayish brown, small ridges and furrows from the center to the margin, covered with short, fine hair. Flesh less than 1 mm. thick, tough. Gills about 1 per mm. at the margin, 1-2 mm. wide, widest in the center, paler than the cap. Stem 6-15 mm. long, 1 mm. or less thick, paler than the cap, curved, glabrous or delicately hairy. Scattered or in groups on the bark of living deciduous trees, especially elm and maple.

3. *MYCENA GALERICULATA*. Edible. Cap 2-4 cm. wide, broadly conical with a definite umbo, surface brown in the center, becoming tan toward the margin, sometimes gray or silvery in age, with irregular yellow, purple brown or reddish brown areas, striate from the margin to the umbo, glabrous. Flesh 2-3 mm. thick, pale tan, tough. Gills 12-15 per cm. at the margin, 2-4 mm. wide, adnate, sinuate or short decurrent, white when young, often pale reddish brown when old, often stained like the cap, edge sometimes slightly wavy, spaces between the gills veined where gills and cap join. Stem 4-12 cm. long, 1-3 mm. thick, reddish brown, pale brown or white near the top, tough, hollow, sometimes twisted, glabrous, the basal portion of several stems often fused and covered with brown or yellow hair. In dense clumps of a few to 20 or more specimens on decaying wood of deciduous and coniferous trees.

4. *MYCENA HAEMATOPA*. Cap 1-3 cm. wide, hemispherical, convex, or campanulate with a definite umbo, pale reddish brown on the margin, becoming darker toward the center, margin striate and usually scalloped. Flesh white to pale pink,

1 mm. thick at the stem, disappearing toward the margin so that the gills are covered only with a thin skin. Gills 12-18 per cm. at the margin, 2-4 mm. side in the middle, light pink to whitish, first narrowly adnate, then ascending, edge minutely fringed when seen with a lens. Stem 4-10 cm. long, 1-3 mm. thick, reddish, hollow, very brittle, when young and fresh exuding a red juice when broken, but this juice is absent or scanty in dry weather; base of stem covered with white hairy mycelium. In clumps of several to 20 specimens on very rotten logs and trees.

5. *MYCENA IMMACULATA*. Cap 4-10 mm. wide, conical or almost hemispherical, margin faintly striate, surface pure white. Flesh less than 1 mm. thick, somewhat tough. Gills about 1 per mm. at the margin, 1-2 mm. wide, adnate, sinuate or short decurrent, white. Stem 2-5 cm. long, 0.5-1 mm. wide, slightly thicker at the top, white, hairy at the base, fragile. Scattered or in groups on moss, leaf litter or decayed wood in moist places in woods.

6. *MYCENA LEAJANA*. Cap 1-2 cm. wide, hemispherical to convex, usually with a broad umbo, bright golden yellow when young, pale yellow when old, outer skin sticky, tough, easily stripped off the entire cap in one piece, margin striate. Flesh white, about 1 mm. thick at the stem, disappearing near the margin. Gills 15-20 per cm. at the margin, 3-4 mm. wide, adnate to adnexed, yellow, edge red although this may be evident only when seen with a lens. Stem 2-6 cm. long, 2-3 mm. thick, brittle, sticky when moist, hollow, yellow throughout or orange red near the top and yellow elsewhere, covered with yellow hairs at the base. In dense clumps of 10 to 50 or more on rotten logs and dead trees of deciduous species.

7. MYCENA PURA. Cap 2-4 cm. wide, convex to flat, often with an inconspicuous, rather broad umbo; surface violet, rose color or rose purple, glabrous, margin striate. Flesh 1-2 mm. thick, white or pale red, watery. Gills 15-20 per cm., 2-5 mm. wide, adnate or sinuate, white, pale violet, or rose colored, often with veins on the sides or between adjacent gills. Stem 5-10 cm. long, 2-4 mm. thick, colored like the cap or paler, hollow, tough, the base hairy. Solitary, scattered or in clumps on rich ground, moss, or very rotten wood in deciduous forests.

8. MYCENA SUBINCARNATA. Cap 5- mm. wide, conical to campanulate, reddish brown in the center, yellowish on the margin, striate from the margin half way to the center. Gills pale flesh color, attached to a ring at the stem. Stem 3-4 cm. long, 1 mm. thick, white, base hairy. Scattered or in groups on the ground in open hardwoods.

Genus OMPHALIA

The genus is distinguished by white spores, a marked depression in the center of the cap, decurrent gills, tough stem and small size.

Key to Species of Omphalia

1. Cap and gills reddish brown to orange brown
 - - *O. campanella*
 - Cap and gills gray or pale brown
 - - *O. epichysium*

Description of Species of *Omphalia*

1. *OMPHALIA CAMPANELLA*. Cap 0.5-3 cm. wide, convex to campanulate with a narrow depression in the center; reddish brown in the center, paler toward the margin, striate from the margin to the center. Flesh less than 1 mm. thick, tough and pliable. Gills 12 per cm. at the margin, 2-3 mm. wide, rather thick, sometimes forked, prominent veins between the gills and extending down the sides of the gills, long decurrent, same color as the cap or slightly paler. Stem 2-4 cm. long, 1-2 mm. thick, uniform in diameter, yellow at the top, dark brown and shiny below, the rind tough, the base thick and usually covered with buff colored mycelium. In dense groups of up to several hundred specimens on decaying stumps and logs of white pine. One such group in which the individual plants were counted by the writer contained 681 specimens.
2. *OMPHALIA EPICHYSIUM*. Cap 2-4 cm. wide, convex with a deep depression in the center, gray to gray-brown, translucent, striate, the margin often wavy. Fleshy thin, gray. Gills 8-12 per cm., 2-4 mm. wide, short decurrent, same color as the cap. Stem 2-4 cm. long, 1-3 mm. thick, uniform in diameter or tapering downward. Solitary or scattered on decaying hardwood logs.

Genus *PANUS*

The genus has white spores, eccentric or lateral stem, tough, leathery texture, gill edges even, not sawtoothed as in *Lentinus*, and habit on wood.

Key to Species of Panus

1. Cap 0.5-2.0 cm. wide, tan to brown, not hairy
- - *P. stipticus*
Cap larger, densely covered with hair - - 2
2. Cap 2-5 cm. wide, reddish brown to tan
- - *P. rudis*
Cap 10-30 cm. wide, white to yellow
- - *P. strigosus*

Description of Species of Panus

1. PANUS RUDIS. Edible. Cap 2-5 cm. wide, funnel shape with a decurved margin, tan to reddish brown when fresh, pale brown to pale tan when dry, densely covered with stiff woolly hairs. Flesh thin, tough and pliable when moist, brittle when dry. Gills decurrent, crowded, narrow, tan. Stem lateral, eccentric, or almost lacking, up to 2 cm. long and 1 cm. wide, very hairy, same color as the cap. In dense clumps or scattered on dead hardwood trees and logs. It is said to be good as a flavoring for gravies, and its toughness certainly would limit its use to that.
2. PANUS STIPTICUS. Inedible. Cap 0.5-2 cm. wide, spathulate or tongue shape to semicircular, convex, the margin often wavy, dark tan when moist, pale when dry. Flesh very thin and tough. Gills slightly darker than the cap, narrow, very close together, frequently with veins between them. Stem lateral, 2-6 mm. long, 2-5 mm. thick, pale tan, pubescent. In clumps of a few to many specimens on decaying hardwood. The fruit bodies shrivel in dry weather, but revive again with moisture. The plant has a very bitter, peppery taste, and is said to be a purgative. Fresh specimens, as well as the wood on which they are growing, are

luminescent, sometimes glowing so brightly that they can be seen several yards away, and it is possible to take a picture of a specimen with no other light than that given off by the fungus itself.

3. PANUS STRIGOSUS. Edible. Cap 10-30 cm. wide, funnel shape with a decurved margin, reniform to almost circular; surface nearly white when fresh, soon becoming yellow, densely covered with long coarse hairs. Gills about 20 per cm. at the margin, 5-15 mm. wide, decurrent, first white, later yellow. Stem 5-15 cm. long, 2-4 cm. thick, eccentric to lateral, densely hairy, first white and either remaining so or becoming yellow. Solitary or in clumps of several specimens on living trees or decaying logs of hardwood species.

Genus PLEUROTUS

The genus is characterized by white spores, an eccentric or lateral stem (although *P. ulmarius* often has a central stem), fleshy texture, and habit on wood.

Key to Species of Pleurotus

1. Stem central to eccentric, 4-10 cm. long, gills sinuate, on living trees - - *P. ulmarius*
Stem lateral, 0-3 cm. long, gills decurrent, on logs - - 2
2. Spore mass white - - *P. ostreatus*
Spore mass pale violet - - *P. sapidus*

Description of Species of Pleurotus

1. *PLEUROTUS OSTREATUS*. Edible. Cap 2-15 cm. wide,
3-11 cm. long, upper surface smooth and white, spathulate to kidney shape, margin decurved or inrolled, usually with a short stem or stempoke base, imbricate in groups of 5-20 or more. Flesh 5-15 mm. thick at the stem, soft and spongy. Gills 18-20 per cm. at the margin, 5-15 mm. wide, decurrent, sometimes uniting to form a net or porelike pattern on the stem, white when fresh, yellow when dry. Stem lateral or eccentric, 1-3 cm. long, .5-2 cm. thick, covered with white mycelium at the base. Common on hardwood logs, rarely on living trees.
2. *PLEUROTUS SAPIDUS*. Edible. The description given above for *Pleurotus ostreatus* applies to this species also. They supposedly differ in that *Pleurotus sapidus* has pale purple spores; a rather heavy spore deposit is necessary to determine this, and whether this minor difference is sufficient to justify separation into a distinct species certainly is questionable.
3. *PLEUROTUS ULMARIUS*. Edible. Cap 5-15 cm. wide,
usually convex, rarely flat, glabrous or with large flat scales toward the center, white or pale tan, the scales darker, to top of overmature specimens often with large cracks. Flesh 1-3 cm. thick at the stem, white, firm or rather tough. Gills about 20-25 per cm. at the margin, 8-15 mm. wide, first sinuate then adnexed or rounded at the stem. Stem 4-10 cm. long, 1-2 cm. thick, solid, firm, usually curved, sometimes eccentric, glabrous or covered with fine hair, white. Usually solitary, but sometimes 2 to 3 specimens appear in a clump, usually from old branchstubs of decaying hardwood trees. Often it is common on street trees in towns.

Genus RUSSULA

The distinguishing characters of the genus are white spores (with the exception of a few species which have pale yellow spores), a peculiar brittle texture of the cap, thick cylindrical stem, and convex to flat or rarely shallow funnel shape cap. It is closely related to *Lactarius* from which it differs chiefly in that the flesh does not exude a juice when broken. Most species are edible, although some have been given a bad name because of their unpleasant taste when raw.

Key to Species of *Russula*

1. Long and short gills alternating (short gills are those that reach from the margin of the cap one-half or less the distance to the stem) cap funnel-shaped - - 2
Few or no short gills, cap usually convex or flat - - 3
2. Cap usually white, often with irregular pale brown splotches, flesh white - - *R. delicata*
Cap brown in the center or all over, flesh turning reddish brown, then dark gray several minutes after being broken - - *R. nigricans*
3. Cap red - - 4
Cap not red - - 8
4. Spores yellow in mass (gills of mature plants yellow) - - 5
Spores and gills white - - 7
5. Flesh turning red, then black, where bruised - - *R. rubescens*
Flesh not turning red - - 6

-
6. Cap scarlet or blood red, 6-13 cm. wide, margin inconspicuously or not at all striate
- - *R. borealis*
Cap pale red, 3-6 cm. wide, margin prominently striate - - *R. rosipes*
7. Taste very bitter and unpleasant - - *R. emetica*
Taste not bitter - - *R. atropurpurea*
8. Cap green - - 9
Cap not green - - 10
9. Surface cracking into patches, cuticle not removable - - *R. virescens*
Surface not cracking into patches, cuticle removable from margin - - *R. aeruginosa*
10. Cap tan to yellowish brown, sticky when young, with acrid odor - - *R. foetans*
Cap dark purple - - *R. atropurpurea*
Cap lemon yellow, pale orange yellow or pale reddish yellow - - 11
11. Taste of flesh peppery 10-20 seconds after it is chewed, cap yellow or pale orange yellow
- - *R. aurantialutea*
Taste not peppery, cap usually reddish yellow
- - *R. amygdaloides*

Description of Species of *Russula*

1. *RUSSULA AERUGINEA*. Cap 5-10 cm. wide, hemispherical when young, later convex to flat, sometimes slightly depressed in the center, surface uniform pale green, grayish green, or dark green, sticky when moist, margin faintly striate, cuticle removable from the cap from the margin half way to the center. Flesh white, firm, brittle, 5-10 mm. thick at the stem. Gills white, 8-12 per cm. at the margin, 4-7 mm. wide, rounded at the margin,

pointed at the stem, almost free, frequently forked at the stem. Stem 5-8 cm. long, 1-2 cm. thick, even, white, solid. Taste mild or none. Solitary or scattered on the ground in coniferous or mixed woods.

2. *RUSSULA AMYGDALOIDES*. Cap 6-12 cm. wide, reddish tan to dull yellow, slightly convex to slightly depressed in the center, broad funnel shape when old; surface very sticky when moist, margin prominently striate, the entire cuticle can be peeled from the surface. Flesh white, brittle, 5-8 mm. thick near the stem. Gills white when young, later yellow, free or nearly so, few short gills, few forked, 8-10 per cm. at the margin, 5-8 mm. wide. Stem 1.5-2 cm. thick, 5-8 cm. long, white. Solitary or scattered on the ground in coniferous and mixed woods.

3. *RUSSULA ATROPURPUREA*. Edible. Cap 5-10 cm. wide, slightly convex, flat, or depressed in the center, surface bright or dark red when young, later becoming dark purple, darker toward the center, sometimes with pale yellow blotches, slightly sticky when young, margin often slightly striate, cuticle easily peeled from the surface. Flesh red under the cuticle, otherwise white or gray. Gills 12-15 per cm. at the margin, 4-8 mm. wide, adnexed, white or pale yellow, spaces between the gills veined where the gills join the cap, a few gills forked near the stem. Stem 4-7 cm. long, 1-3 cm. thick, even, white, delicately hairy, spongy and brittle. Solitary or scattered on the ground or on very rotten wood in coniferous or mixed woods.

4. *RUSSULA AURANTIALUTEA*. Cap 7-14 cm. wide, slightly convex to flat or slightly depressed in the center; surface yellow to orange yellow, sticky when moist, cuticle easily peeled off half way from the margin to the center, margin closely striate. Flesh white, 6-10 mm. thick

near the stem, disappearing near the margin. Gills 6-10 per cm. at the margin, 5-10 mm. wide, rounded at the margin and tapering to a point at the stem, white when young, later yellow, very short decurrent, occasionally forked at the stem. Stem 1.5-3 cm. thick at the top, 5-8 cm. long, white, solid. Taste not obvious immediately, but within half a minute very peppery. Solitary or scattered in conifer woods.

5. *RUSSULA BOREALIS*. Cap 6-13 cm. wide, first nearly spherical, later flat or depressed in the center, uniform scarlet or blood red, not sticky, cuticle easily peeled from the surface, margin smooth or striate for only a few millimeters. Flesh red beneath the cuticle, otherwise white, 6-10 mm. thick at the stem, extending out to a few millimeters from the margin. Gills 5-10 per cm., 7-10 mm. wide, 1-1.5 mm. thick, pale yellow, prominent veins between adjacent gills where they join the cap, coming to a point on the stem, rounded at the margin, sometimes the edges near the stem are pale red. Stem 6-12 cm. long, 1.5-3 cm. thick at the top, uniform in diameter, usually tinged reddish, sometimes red only in places, sometimes entirely white, solid. Usually scattered, sometimes solitary, on the ground in forests.

6. *RUSSULA DELICA*. Edible. Cap 10-20 cm. wide, at first with a central depression and incurved margin, later the margin upraised so that the cap is broad funnel shape; surface dull white, often with rusty brown patches, glabrous or delicately hairy. Flesh 5-12 mm. thick, white, firm. Gills 8-12 per cm. at the margin, 4-8 mm. wide, short decurrent, white, few forked, short and long gills alternating. Stem 2-5 cm. long, 1-3 cm. thick cylindrical or tapering downward, sometimes with a narrow pale green or blue zone just beneath the gills, glabrous or slightly hairy. Solitary or in groups of 2 or 3 on the ground in deciduous or mixed woods. In the writer's experience this is the fungus most

commonly parasitized by the Ascomycete *Hypomyces lactifluorum*, described on page 59.

7. *RUSSULA EMETICA*. Edible. Cap 4-8 cm. wide, convex, flat, or slightly depressed in the center, surface bright red when fresh, fading to pale red when old, cuticle easily peeled off, surface slightly sticky when young, margin prominently striate. Flesh pale red under the cuticle, otherwise white, 2-4 mm. thick at the stem, disappearing toward the margin. Gills 8-12 per cm. at the margin, 4-8 mm. wide, narrowly adnexed or free, white, spaces between them, veined where the gills join the cap, a few forked near the stem. Stem 4-7 cm. long, 1-2 cm. thick, cylindrical or tapering upward, white or tinged red, spongy, solid. Solitary or scattered on the ground or very rotten wood in swampy places. When raw it has a very biting taste, but this disappears upon cooking.

8. *RUSSULA FOETANS*. Cap first spherical and 3-4 cm. in diameter as it appears above the ground, very sticky, on the incurved margin the sticky material is 2-3 mm. thick and transparent; later the cap becomes hemispherical and may remain so or become flat with the margin decurved, yellowish tan to pale brown, coarsely striate for 2-3 cm. in from the margin, cuticle easily peeled off and often dry at maturity although it almost always is sticky when moist. Flesh 5-10 mm. thick at the stem, disappearing half way to the margin, white. Gills white or pale yellow, 8-12 per cm. at the margin, 6-10 mm. wide, sinuate or short decurrent, often forked at the stem, veins between adjacent gills near the margin, exuding drops of liquid from the edges when fresh. Stem 6-12 cm. long, 2-4 cm. thick, white, pale brown where bruised, quickly hollowed out by insect larvae. Odor acrid and characteristic when fresh, putrid when old. On the ground under trees in lawns and in woodlots and forests.

9. *RUSSULA NIGRICANS*. Edible. Cap 8-13 cm. wide, depressed in the center, the margin decurved when young, upraised in overmature specimens, dirty white at the margin, brown toward the center, when old the center is dark brown, the margin gray, surface sticky when moist, the cuticle easily peeled off. Flesh 1-1.5 cm. thick at the stem, 2-3 mm. thick at the margin, white when first broken, slowly becoming pale reddish brown, then bluish or dark gray. Gills white, adnate, 12-18 per cm. at the margin, 4-5 mm. wide, many short gills alternating with the long ones. Stem 6-10 cm. long, 1.5-3.5 cm. thick at the top, tapering gradually toward the base, solid, white, becoming grayish brown where handled, interior becoming definitely red where bruised. Scattered on the ground in conifer woods.

10. *RUSSULA ROSEIPES*. Edible. Cap 3-6 cm. wide, convex, flat, or slightly depressed in the center, surface bright red or sometimes yellowish in the center, sticky when young, the cuticle easily peeled off, margin prominently striate. Flesh thin, white. Gills 15 per cm. at the margin, 3-5 mm. wide, free or slightly adnexed, white when young, soon definitely yellow, spaces between the gills veined where gills and cap meet, few gills forked. Stem 3-5 cm. long, 6-12 mm. thick, cylindrical or tapering gradually upward, pale red, spongy. Solitary or scattered on the ground in coniferous and mixed woods.

11. *RUSSULA RUBESCENS*. Edible. Cap 4-10 cm. wide, convex to flat, surface dull red, sometimes with indistinct blotches of yellow or violet, margin faintly striate. Flesh white or nearly so, when wounded becoming red, then black, when old becoming gray. Gills 15-20 per cm. at the margin, 4-8 mm. wide, narrowly adnate, white when young, pale yellow or cream colored when mature. Stem 3-7 cm. long, 1-2.5 cm. thick, white to gray,

when bruised becoming first red, then gray. On the ground in woods.

12. *RUSSULA VIRESCENS*. Edible. Cap 5-12 cm. wide, convex, flat, or slightly depressed in the center; surface uniform green when young, later the superficial green layer breaking up into irregular patches, especially toward the margin, exposing the white beneath. Flesh 5-10 mm. thick, white, not changing color. Gills 8-12 per cm. at the margin, 5-10 mm. wide, usually free, occasionally forked near the stem, few short gills, white. Stem 3-7 cm. long, 1-2 cm. thick, often tapered near the base, white or pale green, solid but spongy. Solitary or scattered on the ground in coniferous and deciduous woods.

Genus *SCHIZOPHYLLUM*

The genus is distinguished by white spores and gills that are divided along the edge into two halves that in dry weather curl up, with the spore bearing surface on the inner side. When a dry fruit body is moistened the gill halves unroll slowly and soon begin to produce spores again. A fruit body will remain viable for at least several months. Only a single species is common.

1. *SCHIZOPHYLLUM COMMUNE*. Cap 1-3 cm. wide, semi-circular or almost circular, surface densely hairy, gray when young and fresh, almost white when old, margin inrolled or incurved. Context or flesh 1-2 mm. thick, gray, pliable when moist, brittle when dry. Gills 10-15 per cm., 2-3 mm. wide, radiating from the point where the fruit body is attached, grayish white or pale tan, split and in dry weather curled, the exposed sides of the curled gills covered with fine gray hair visible with a lens. Usually in groups or clumps on branches and trunks of recently dead hard-

wood trees.

Genus TRICHOLOMA

The distinguishing character of the genus supposedly is the sinuate attachment of the gills to the stem. Actually the gills are likely to be adnate in young specimens and short decurrent in older ones, making the genus somewhat difficult to separate from *Clitocybe*. The spores are white and the plants grow only on the ground. Hard in "The Mushroom" and Kauffman in "Agaricaceae of Michigan" each describe 37 species of *Tricholoma*, and together they describe 70 species, Hard working mainly in Ohio and Kauffman in the adjacent state of Michigan. At present many of the species are very difficult to identify, and only a few of the more common ones are described here.

Key to Species of *Tricholoma*

1. Whole plant pale lavender when fresh, fading to grayish lavender - - *T. personatum*
Whole plant sulphur yellow - - *T. sulphureum*
Cap brown or grayish brown - - 2
2. Cap sticky when young and moist, reddish brown, gills pale yellow - - *T. flavobrunnea*
Cap not sticky (old dry plants must be moistened to determine this) - - 3
3. Cap brown when moist, tan and shiny when dry
- - *T. melaleucum*
Cap gray or grayish brown, not becoming paler when dry, velvety or delicately scaly
- - *T. terreum*

Description of Species of *Tricholoma*

1. *TRICHOLOMA FLAVOBRUNNEA*. Cap 4-7 cm. wide, at first almost hemispherical and with an umbo, later convex then flat; surface covered with dark brown fine radial fibers, the umbo darker, entire surface sticky when moist, margin incurved for a long time, later flat, often wavy. Flesh 1-2 cm. thick near the stem, 1 mm. thick at the margin, firm, white or pale yellow, becoming reddish brown around larval tunnels or where wounded, of the same texture as the stem. Gills adnate to long decurrent in young specimens, sinuate when mature, yellow, 3-7 mm. wide, 20 per cm. at the margin, occasionally forked, becoming reddish brown slowly where bruised and also on the edge. Stem 5-9 cm. long 8-12 mm. thick, fibrous, yellowish brown toward the top, darker toward the bottom, streaked with reddish brown when old, often several stems joined at the base. Odor of crushed flesh strong, and reminiscent of wheat meal. In groups or clumps on the ground in swamps and low places.
2. *TRICHOLOMA MELALEUCUM*. Edible. Cap 2-7 cm. wide, slightly convex to flat, with a definite umbo in the center, brown and sometimes slightly sticky when moist, gray or grayish brown when dry, the margin sometimes faintly striate. Flesh 2-7 mm. thick near the stem, practically disappearing one-half or two-thirds the way to the margin, soft, white, easily peeled off in layers. Gills 20-25 per cm. at the margin, 4-7 mm. wide, sinuate or almost free, many gills of intermediate length, white at first, later pale brown. Stem 2-9 cm. long, 4-10 mm. thick at the top, cylindrical or tapering either up or down, pale brown, striate and usually twisted, the base often enlarged slightly and sometimes covered with white mycelium that binds the soil or leaf mold together and thus causes a little clump of it to be brought up when

plants are picked. Usually in groups of 2 or 3 to a dozen on the ground in grassy places in lawns and woods.

3. *TRICHOLOMA PERSONATUM*. Edible. Cap 5-12 cm. wide, at first convex with a strongly incurved margin, later convex to flat; the margin first covered with fine fuzz, later naked, decurved and wavy in mature plants; surface pale watery gray when young, usually pale lavender when mature and fading to dirty white. Flesh 1-2 cm. thick, pale lavender to pale gray. Gills sinuate, adnate, or almost free, close, at first pale blue, then lavender or grayish white, easily peeled from the flesh of the cap. Stem 3-8 cm. long, 1-3 cm. thick, enlarged at the base, same color as the cap. In groups and often dense clumps on the ground in woodlots, mixed woods and hardwood forests. At times it is so abundant that literally bushels of it can be picked within a short time.
4. *TRICHOLOMA SULPHUREUM*. Cap 3-8 cm. wide, slightly convex or flat with an umbo, brownish yellow in the center, sulphur yellow toward the margin, silky when young, glabrous when mature. Flesh pale yellow, 5-10 mm. thick near the stem. Gills yellow, first adnexed, then sinuate, 6-10 mm. wide, 10-15 per cm. at the margin. Stem 5-10 cm. long, 5-10 mm. thick, cylindrical or enlarged toward the base, yellow or brownish yellow on the surface, yellow within, fibrous, somewhat brittle. The flesh usually has an unpleasant odor when crushed, but this is not invariably present. Usually in groups in deciduous or mixed woods.
5. *TRICHOLOMA TERREUM*. Edible. Cap 3-6 cm. wide, convex to flat, with a small umbo, surface gray or grayish brown, velvety or delicately scaly. Flesh 2-4 mm. thick near the stem, almost disappearing about half way to the margin, pale gray, soft. Gills 12-15 per cm. at the

margin, 5-10 mm. wide, adnate or sinuate, edge often uneven, white or pale gray, sometimes with yellow areas. Stem 3-6 cm. long, 5-10 mm. thick, cylindrical, often curved, gray or pale brown, solid, fibrous and splitting lengthwise readily. Solitary, in groups, or in small clusters on the ground in open coniferous and hardwoods.

Genus TROGIA

The genus is distinguished by white spores, the stemless, shelflike fruit bodies made up of a number of lobes, and the rounded, ridgelike or veinlike gills. The fruit bodies are tough and pliable, shrinking and becoming very inconspicuous in dry weather by reviving rapidly when moistened. Only a single species is known to be common.

1. TROGIA CRISPA. Cap 1-3 cm. wide, surface covered with fine hair, pale tan when fresh, brown when old, with varicolored concentric zones, the margin definitely lobed and wavy and usually lighter in color than the rest of the cap. Flesh 1-2 mm. thick, pale brown, tough and flexible when moist, brittle when dry. Gills white, ridgelike, branched frequently, wavy, radiating from the point where the fruit body is attached to the wood. In densely imbricate clumps on old logs and fallen branches of hardwoods, especially birch.

YELLOW-BROWN SPORED MUSHROOMS

Genus BOLBITIUS

The genus has rusty brown spores, a fragile cap and stem, and gills that become soft and watery in moist weather. Only a single species is described here.

1. BOLBITIUS TENER. Cap of young specimens up to 1 cm. wide and 2 cm. high and narrow conical, when mature broad conical and 3-6 cm. wide, pale yellow to nearly white, slightly sticky when fresh, striate from the margin about $\frac{1}{3}$ the way to the center, the margin splitting in several places as the cap expands. Flesh about 1-2 mm. thick in the center, otherwise practically non-existent. Gills 1-3 mm. wide, 20-25 per cm. at the margin, free or nearly so, white when young, soon yellowish brown, then dark brown, in moist weather becoming liquid so that nothing remains of the cap but a few moist shreds. Stem 6-12 cm. long, 2-3 mm. thick at the top, increasing slightly in diameter downward and the base enlarged into a small bulb that is covered with mycelium. Scattered or in groups on lawns, sometimes in hundreds, usually evident in early morning.

Genus CORTINARIUS

The genus is characterized by rusty brown spores and a veil in which each hypha is distinct and separate. This delicate veil is visible almost only in young specimens just as the cap is expanding, and it is the chief character by which members of the genus can be recognized. The gills are white or colored when young but become rusty brown in age from the color of the spores. It is one of the

larger genera of gilled fungi, and Kauffman in "Agaricaceae of Michigan" includes 153 species; some of these grade into one another, and even with the use of microscopic characters one must have long experience to identify many of these with any degree of certainty. Only those have been included here which in the writer's experience were most common in the areas visited and which seemed identifiable by field characters.

Key to Species of *Cortinarius*

1. Cap sticky when moist - - 2
Cap not sticky - - 3
2. Stem encircled by one or more irregular reddish bands up to 5 mm. wide - - *C. armillatus*
Stem white and very sticky when young, no reddish bands on the stem - - *C. mucifluus*
3. Cap with small scales - - 4
Cap smooth and silky - - 5
4. Cap tan, gills pale violet when young
- - *C. deceptivus*
Cap violet, metallic shiny, gills dark violet when young - - *C. violaceus*
Cap yellow to golden brown, gills pale yellow when young - - *C. annulatus*
Cap yellowish brown, gills orange red to crimson when young - - *C. semi-sanguineus*
5. Gills light brown when young, about 10-12 per cm. - - *C. distans*
Gills violet when young - - 6
Gills orange red to crimson when young - - 8
6. Gills tan when old - - *C. deceptivus*
Gills dark brown when old - - 7

7. Stem pale violet and sticky when young, brown when old - - *C. cylindripes*
Stem pale violet when young and remaining so, not sticky, the base enlarged into a bulb
- - *C. alboviolaceous*
8. Cap orange red - - *C. cinnabarinus*
Cap yellowish brown - - *C. semisanguineus*

Description of Species of *Cortinarius*

1. *CORTINARIUS ALBOVIOLACEOUS*. Edible. Cap 3-10 cm. wide, convex, often with a broad umbo, shiny with a silky sheen, pale violet to nearly white, margin incurved. Flesh pale violet. Gills 15-20 per cm. at the margin, 4-8 mm. wide, at first adnate, later sinuate or short decurrent, at first pale violet, later purple, then cinnamon brown, edge fringed when seen with a lens. Stem 3-8 cm. long, 5-12 mm. thick at the top, the base gradually enlarged into an oval bulb, solid, spongy, pale violet. Scattered or in groups on the ground in low, moist woods.
2. *CORTINARIUS ANNULATUS*. Cap 4-9 cm. wide, convex to almost flat, yellow to golden brown, with a bronze lustre, covered with very numerous, minute, pointed, erect brown scales. Flesh thick, pale tan. Gills about 15 per cm. at the margin, 4-8 mm. wide, at first pale yellow, later brown, usually the edge paler. Stem 4-10 cm. long, 8-15 mm. thick at the top, increasing gradually in thickness downward, covered to above the middle by a delicate, silky sheath, pale brown or yellow, with an indistinct annulus. Scattered or in groups on moist ground in deciduous or mixed forests.

3. *CORTINARIUS ARMILLATUS*. Edible. Cap 5-12 cm. wide, at first almost hemispherical, later slightly convex or flat, surface slightly sticky when fresh or in wet weather, reddish brown, paler toward the margin, smooth or slightly scaly, margin sometimes projecting beyond the gills. Flesh pale lavender to white. Gills about 15-20 per cm. at the margin, 6-12 mm. wide, adnate or sinuate, first nearly white, later rusty brown. Stem 6-15 cm. long, 1-2 cm. thick at the top, tapering upward, the base gradually enlarged into a bulb, reddish tan or brown, often paler toward the top, often encircled by one or more reddish irregular bands up to 5 mm. wide, consisting of the remains of the veil. Often there is a faint ring. Solitary or scattered on soil and very rotten wood in coniferous forests.
4. *CORTINARIUS CINNABARINUS*. Cap 3-6 cm. wide, campanulate, convex, or flat with an umbo, surface silky shiny, bright orange red to reddish tan or reddish brown, surface sometimes cracked and the margin split. Flesh pale reddish brown. Gills about 20-30 per cm. at the margin, 6-15 mm. wide, first orange red, later brownish red, first adnate, then emarginate. Stem 2-5 cm. long, 4-8 mm. thick at the top, sometimes tapering upward, orange red or reddish brown, fibrous, hollow when old. Veil orange red. Scattered on the ground in hardwood forests.
5. *CORTINARIUS CYLINDRIPES*. Cap 3-7 cm. wide, at first oval, later campanulate, violet when young, then yellowish violet and finally brown, margin incurved and delicately striate. Flesh thin, pale violet to white. Gills 15-20 per cm. at the margin, 4-8 mm. wide, first adnate, later sinuate, violet when young, brown when old, the edge paler and fringed or delicately saw-toothed. Stem 8-10 cm. long, 4-10 mm. thick at the top, at first sticky and violet colored, later the

sticky material drying and cracking into patches and the stem becoming brown, usually with a faint ring or annulus, pale violet within. Scattered or in groups on low, moist ground in woods.

6. *CORTINARIUS DECEPTIVUS*. Cap 2-7 cm. wide, at first oval, later campanulate to convex, tan or light brown, at first with a tinge of pale violet which later is not evident, when young covered with minute brown scales, when old usually glabrous and finely wrinkled. Flesh thin, pale violet when young, when old pale tan. Gills about 20 per cm. at the margin, 3-5 mm. wide, first adnate, then sinuate, pale violet when young, later tan. Stem 3-6 cm. long, 4-10 mm. thick at the top, in young plants before the stem elongates the base is gradually enlarged and club shape, but this is not evident in mature plants. When young the stem is covered by fibrous, violet colored remnants of mycelium, but when mature the stem is pale tan or nearly white. Scattered or in groups on the ground in low, moist coniferous or mixed woods.

7. *CORTINARIUS DISTANS*. Cap 4-9 cm. wide, at first rather conical, later campanulate, or flat with an umbo, the margin decurved and often split, the surface brown and watersoaked in wet weather, silky when dry. Flesh 4-6 mm. thick, pale brown or yellow. Gills 6-10 per cm. at the margin, 8-12 mm. wide, first adnate, later sinuate, light brown when young, dark reddish brown when old. Stem 4-8 cm. long, 5-12 mm. thick at the top, sometimes tapering downward, often curved, brown, in dry weather with a white zone near or below the middle from the remains of the veil. Scattered or in groups on the ground in grassy open places in deciduous woods.

8. *CORTINARIUS MUCIFLUUS*. Edible. Cap 3-8 cm. wide, first almost globose, then campanulate with an incurved margin, later flat, with or without an umbo, surface very sticky as if covered with a layer of mucilage when moist, pale yellow, orange, or brown, often with reddish stains, shiny when dry. Flesh pale yellow to reddish. Gills about 20 per cm. at the margin, 4-8 mm. wide, at first pale gray, then dark tan, later reddish brown. Stem 6-12 cm. long, 6-12 mm. thick at the top, cylindrical or tapering slightly downward, at first whitish and very sticky, the mucilaginous portion drying and cracking into scaly bands and becoming yellow to brown, with a faint ring or annulus. Solitary, scattered, or in groups on low moist ground, often in moss covered areas, in coniferous and deciduous forests.
9. *CORTINARIUS SEMISANGUINEOUS*. Cap 2-6 cm. wide, at first conical, later campanulate, or convex with an umbo, yellowish brown, silky or with delicate scales, margin often split. Flesh pale yellow. Gills about 20 per cm. at the margin, 2-5 mm. wide, orange red to crimson, first adnate, later short decurrent. Stem 3-8 cm. long, 3-6 mm. wide at the top, yellow, solid, fibrous. Veil yellowish brown. Scattered or in groups on the ground in swamps and low places, and in sphagnum bogs.
10. *CORTINARIUS VIOLACEOUS*. Edible. Cap 5-15 cm. wide, convex to almost flat with the margin decurved, surface covered with numerous minute, erect scales, violet, metallic shiny. Flesh thick, gray to dark violet. Gills about 15 per cm. at the margin, 6-12 mm. wide, first adnate, later sinuate, often with veins between adjacent gills where the gills join the cap, first dark violet, later grayish brown. Stem 8-12 cm. long, 10-15 mm. thick at the top, solid, gradually enlarged at the base into a thick bulb, dark violet outside

and within. Solitary or scattered on the ground in coniferous and mixed woods.

Genus CREPIDOTUS

The genus has brown spores and only a short lateral stem or no stem at all, the shelflike fruit bodies being attached by their base to wood; the fruit bodies are soft, decay quickly, and usually do not persist more than a few days at most.

Key to Species of Crepidotus

1. Surface hairy when young - - 2
Surface not hairy - - 4
2. Surface brown, densely covered with brown hairs when young, scaly and tan to yellow when old
- - *C. fulvotomentosus*
Surface white or pale tan - - 3
3. Cap 3-8 cm. wide, covered with short hairs
- - *C. putrigenus*
Cap 8-20 mm. wide, covered with fine, long hairs - - *C. versutus*
Cap 3-10 mm. wide, covered with fine long hairs
- - *C. herbarum*
4. Cap 3-10 mm. wide - - *C. herbarum*
Cap 1-5 cm. wide - - 5
5. Gills 30-50 per cm. - - *C. mollis*
Gills 15-20 per cm. - - 6
6. Surface sticky when moist, margin not striate
- - *C. haerens*
Surface not sticky, margin delicately or prominently striate - - *C. malachius*

Description of Species of *Crepidotus*

1. *CREPIDOTUS FULVOTOMENTOSUS*. Cap 1-5 cm. wide, semicircular to reniform or kidney shape, stem short or absent, margin incurved when young, surface light brown when young and with a dense covering of hair, later becoming tan with faint scales. Gills 20 per cm. at the margin, 2-8 mm. wide, radiating from the stemlike base, first white, then brown, the edge delicately fringed with white. Scattered or in clumps on decayed wood.
2. *CREPIDOTUS HAERENS*. Cap 1-5 cm. wide, convex to flat, semicircular or reniform, margin first inrolled, later decurved, surface sticky when moist, watersoaked brown or gray with delicate striations, almost white when dry, white hairy at the stemlike base. Gills about 20 per cm. at the margin, 1-3 mm. wide, radiating from the stemlike base, first white, later brown. Scattered on decaying wood of deciduous trees.
3. *CREPIDOTUS HERBARUM*. Cap 3-10 mm. wide, oval or semicircular, slightly convex, margin decurved to flat when mature, surface white and covered entirely or only at the base with rather long, fine hairs. Gills 12-15 per cm. at the margin, 1 mm. wide, radiating from a common point, first white, later brown. Scattered and in clumps on decaying wood.
4. *CREPIDOTUS MALACHIUS*. Cap 1-4 cm. wide, slightly convex, spatulate to reniform, stem short or lacking, watery gray when moist, almost white when dry, margin delicately or prominently striate. Gills 15-20 per cm. at the margin, 2-5 mm. wide, white when young, later light brown. Stem, when present, covered with dense white hair. Scattered or in groups on decaying wood.

5. *CREPIDOTUS MOLLIS*. Cap 1-5 cm. wide, half oval to reniform, slightly convex to flat, the margin first inrolled, later decurved, surface when moist grayish brown and sometimes slightly sticky, covered with an elastic cuticle that can be peeled off, pale tan to white when dry. Flesh 1-2 mm. thick, limp, pale tan or white. Gills about 30-50 per cm. at the margin, 1-4 mm. wide, radiating from the stemlike base, first white, then brown. In imbricate clumps with the fruit bodies overlapping one another, on decaying wood.
6. *CREPIDOTUS PUTRIGENUS*. Cap 3-8 cm. wide, convex, dull white or yellowish white, densely covered with short coarse hair, margin decurved. Flesh 3-7 mm. thick at the base, white when dry, gray when moist. Gills 20-25 per cm. at the margin, 4-10 mm. wide, radiating from the stemlike base. Odor and taste disagreeable. Solitary or scattered on decaying wood.
7. *CREPIDOTUS VERSUTUS*. Cap 8-20 mm. wide, half oval or reniform, margin incurved, surface white, covered with rather fine long hairs. Flesh 1 mm. or less thick, white. Gills 25-30 per cm. at the margin, up to 2 mm. wide, radiating from a common point, first white, later brown. In rather dense clumps on decaying wood.

Genus FLAMMULA

The genus is characterized by yellow to brown spores, yellow to orange cap, fibrous stem that is continuous with the flesh of the cap, absence of a definite ring, and growth on wood. Most species have a rather bitter taste when raw and their edibility has not been tested, so far as the writer knows, probably because they seldom are found in sufficient quantity to warrant it.

Key to Species of *Flammula*

1. Cap sticky - - 2
Cap not sticky - - 3
2. Cap with concentric rows of scales near the margin, spores with a faint purple tinge in mass - - *F. polychroa*
Cap without scales, epidermis can be peeled off the entire surface of the cap - - *F. spumosa*
3. Cap dry, golden yellow to yellowish brown, on coniferous wood - - *F. sapinea*
Cap moist and slippery, bright yellow to reddish brown, often with a tinge of green, on the wood of deciduous trees - - *F. alnicola*

Description of Species of *Flammula*

1. *FLAMMULA ALNICOLA*. Cap 5-9 cm. wide, convex to flat, surface slippery, often delicately scaly, bright yellow when young, reddish brown or tinged with green when old. Gills about 20 per cm. on the margin, 4-8 mm. wide, first adnate, later short decurrent, pale yellow when young, reddish brown when old. Stem 5-10 cm. long, 6-12 mm. thick, yellow when young, later brown, curved, tapering downward, with a rootlike base. In small clusters on stumps and branches of alder, birch, willow and other hardwoods.
2. *FLAMMULA POLYCHROA*. Cap 3-7 cm. wide, first convex, later almost flat to depressed in the center, surface orange brown to yellow brown in the center, paler toward the margin, very sticky when young, with concentric rows of delicate yellow or brown triangular scales near the margin. Flesh pale yellow. Gills 20-25 per cm. at the margin, 3-6 mm. wide, tapering toward the margin,

first adnate, later sinuate to short decurrent, tan when young, becoming dark grayish brown tinged with purple, edge fringed with white. Stem 3-6 cm. long, 3-5 mm. thick, reddish brown and delicately scaly up to the faint annulus, yellow above the annulus, curved, tough and fibrous. The spores in mass have a faint purple tinge. Solitary or in crowded groups on decaying wood of coniferous and deciduous trees.

3. *FLAMMULA SAPINEA*. Cap 2-8 cm. wide, at first conical, later with a broad umbo and decurved margin, golden yellow to yellowish brown, paler toward the margin, covered with minute flat scales, overmature specimens often with 1-3 large cracks in the center. Flesh pale yellow. Gills 20 per cm. at the margin, 2-6 mm. wide, at first yellow, later brown. Stem 4-9 cm. long, 4-10 mm. thick at the top, cylindrical, silky and shiny, usually curved, sometimes flattened, yellow like the cap, often stained brown when bruised, the base frequently covered with woolly white mycelium. Solitary or in clumps on decaying stumps and logs of coniferous wood.

4. *FLAMMULA SPUMOSA*. Cap 3-8 cm. wide, convex to flat, the margin often definitely decurved, yellow brown in the center, yellow toward the margin, with a sticky cuticle that can be stripped off easily. Flesh 5-8 mm. thick near the stem, tapering to 1 mm. at the margin, yellow or greenish yellow. Gills 15-25 per cm. at the margin, 3-5 mm. wide, adnate when young, becoming sinuate or short decurrent, at first bright yellow or yellowish green, later pale reddish brown. Stem 3-8 cm. long, 3-8 mm. thick, reddish brown at the base, yellow near the top, tough and fibrous. Scattered or in crowded groups on very rotten coniferous logs.

Genus GALERA

The genus has rusty to rather dark brown spores, fragile thin caps, slender, fragile and hollow stems, and is found on mossy or grassy ground, frequently in swamps, and on manure piles and manured ground. So far as is known, none of them have been tested for food. Kauffman's "Agaricaceae of Michigan" includes 12 species, one of which is unnamed, and several of apparently were rarely found. Only 3 species have been commonly found by the writer.

Key to Species of Galera

1. Growing on moss in swamps - - *G. hypnorum*
Growing usually on manure heaps, stem with a
horizontal root 4-8 cm. long - - *G. antipus*
Growing usually on lawns and in pastures, stem
without a root - - *G. tenera*

Description of Species of Galera

1. *GALERA ANTIPUS*. Cap 1-4 cm. wide, conical, campanulate or almost convex, brown when moist, pale tan when dry. Gills 25 per cm. at the margin, 2-3 mm. wide, narrowly adnate, pale brown when young, dark brown when old. Stem 3-6 cm. long, 2-4 mm. thick above the ground, enlarged at the base and with a subterranean rootlike part extending 4-8 cm. horizontally. Scattered or in groups on manure heaps.
2. *GALERA HYPNORUM*. Cap 6-20 mm. wide, conical or campanulate, watery yellowish brown and striate when moist, pale tan when dry. Gills about 15 per cm. at the margin, 1-4 mm. wide, adnate, brown, edge delicately fringed when seen with a lens. Stem 3-6 cm. long, 1-3 mm. thick,

brown fragile. Scattered on moss in swamps.

3. *GALERA TENELLA*. Cap 1-3 cm. wide, usually conical to campanulate or hemispherical with a rather sharp point, tan when moist, almost white when dry, margin finely striate, the top cuticle or skin easily peeled off, surface of fresh specimens often covered with minute shiny particles that may be visible only with the aid of a lens. Gills 20-25 per cm. at the margin, 1-3 mm. wide, adnate, brown. Stem 3-8 cm. long, 1-2 mm. wide, brittle, shiny, light tan to white. Scattered on lawns, and in pastures and grassy fields.

Genus *INOCYBE*

The genus has rather light brown spores, a conical to campanulate cap that is fibrous or scaly, and the gills vary from short decurrent to free. The spores of many species are very angular, which is rather unusual among mushroom spores. Kauffman's "Agaricaceae of Michigan" includes 31 species, but a considerably larger number have been described in Europe. Of these, only the 6 species found most commonly by the writer are included here.

Key to Species of *Inocybe*

1. Cap white or pale tan - - 2
Cap brown, scaly or radially cracked - - 3
2. Edge of gills irregular - - *I. fibrosa*
Edge of gills regular - - *I. geophylla*
3. Cap scaly - - 4
Cap radially cracked - - 5
4. Cap conical when young - - *I. calospora*
Cap convex when young - - *I. caesariata*

5. Cap yellowish white to golden brown
- - *I. fastigiata*
Cap dark brown - - *I. rimosa*

Description of Species of *Inocybe*

1. *INOCYBE CAESARIATA*. Cap 2-4 cm. wide, hemispherical or convex when young, flat, umbonate or depressed in the center when old, yellowish brown, darker in the center; surface covered with small hairy scales, margin at first connected to the stem by a thin, pale yellow veil that remains on the margin for a short time as the cap expands. Flesh pale tan, sometimes darker and watery just above the gills, 2-3 mm. thick at the stem, less than 1 mm. at the margin. Gills 20-25 per cm. at the margin of the cap, 2-3 mm. wide, tan when young, yellowish brown at maturity, first adnate, later sinuate, the edge white and delicately fringed when seen with a lens. Stem 2-3 cm. long, 2-5 mm. thick, paler than the cap, silky and shiny or delicately scaly, cylindrical or tapering downward. In groups in the woods.
2. *INOCYBE CALOSPORA*. Cap 1-3 cm. wide, conical or narrowly campanulate when young, later flat with a small pointed umbo, first dark brown, then yellowish brown toward the margin but the pointed umbo remaining dark, covered from margin to umbo with small loose or recurved scales. Flesh pale brown. Gills 10-12 per cm. at the margin, 2-3 mm. wide, grayish tan when young, brown when old, edge white. Stem 3-6 cm. long, 1.5-2.5 mm. thick, brown, often curved, sometimes expanded at the base into a small bulb. Scattered or in groups on the ground in low, moist deciduous woods.

3. *INOCYBE DESTRICTA*. Cap 2.5-4 cm. wide, first conical, then campanulate, later flat with a definite umbo, uniformly dark brown or dark brown on the umbo and paler toward the margin, covered with fine scales that are obvious only when the cap is wet; the surface layer cracks radially from the margin inwards as the cap expands, exposing the lighter colored flesh beneath. Flesh 2-3 mm. thick near the stem, disappearing near the margin, pale tan or white, firm. Gills 15-20 per cm. at the margin, 5-7 mm. wide, sinuate or adnexed, first gray, brown when mature, edge delicately fringed when seen with a lens. Stem 4-6 cm. long, 3-5 mm. in diameter at the top, cylindrical or slightly enlarged at both the top and the bottom, pale brown, striate, often twisted, fibrous, solid, the interior very brittle. In groups on the ground in conifer woods. This species looks much like *Inocybe rimosa*, and can be distinguished from that species only by the microscopic cystidia, each with a mass of crystals at the top, on the sides of the gills of *I. destricta*.

4. *INOCYBE FASTIGIATA*. Cap 3-7 cm. wide, first conical, then campanulate, later almost flat with a prominent umbo, surface yellowish white to golden brown, the surface radially cracked from margin to umbo and exposing the lighter colored flesh beneath, margin often split in age. Flesh 1-3 mm. thick near the stem, pale tan. Gills 12-15 per cm. at the margin of the cap, 4-8 mm. wide, adnexed to sinuate, grayish when young, dark grayish brown when old. Stem 5-9 cm. long, 4-10 mm. thick, usually striate, often twisted, white to pale brown, slightly enlarged at the base. Scattered or in groups on the ground in swampy woods.

5. *INOCYBE FIBROSA*. Said to be poisonous. Cap 3-6 cm. wide, broad conical to almost flat, with a low umbo, pale cream yellow, with a band of netlike wrinkles between the margin and the center. Flesh 3-5 mm. thick near the stem, gradually thinner toward the margin, white, firm. Gills about 20 per cm. at the margin of the cap, 4-7 mm. wide, free, first white, then grayish tan, the edge white when seen with a lens and irregular or toothed. Stem 6-10 cm. long, 8-12 mm. thick at the top, tapering downward, definitely striate, shiny, nearly white, fibrous and splitting lengthwise easily, hollow. Scattered or in groups on the ground near deciduous trees.
6. *INOCYBE GEOPHYLLA*. Cap 1-3 cm. wide, conical when young, flat with an umbo when old, surface white or pale tan, with a silky sheen. Flesh white. Gills 15-20 per cm. at the cap margin, 3-5 mm. wide, adnexed, white when young, pale grayish brown when old. Stem 2-5 cm. long, 2-3 mm. thick, white and silky, delicately hairy at the top. Scattered or in groups on the ground in coniferous and deciduous woods. *Inocybe lilacina*, sometimes given as a variety of *Inocybe geophylla*, differs only in that the cap and stem are tinged with violet.
7. *INOCYBE RIMOSA*. Cap 2-5 cm. wide, at first conical, later campanulate with a conical umbo, surface silky, splitting as the cap expands and forming irregular furrows, tan to brown, the flesh exposed by the split surface lighter in color, margin often split, sometimes wavy or irregularly scalloped. Gills 15 per cm. at the margin of the cap, 2-4 mm. wide, almost free, grayish brown, edge white. Stem 4-8 cm. long, 3-5 mm. thick, cylindrical, pale brown or white, sometimes expanded into a flattened bulb at the base. Scattered or in groups on the ground in coniferous and hardwood swamps.

Genus NAUCORIA

The genus has brown spores, the margin of the cap first incurved when young, gills adnate or adnexed, and the stem tough and fibrous. More than 20 species have been described in the United States, but the writer has encountered only two commonly.

Key to Species of Naucoria

1. Cap yellow to yellowish brown, stem not flattened - - *N. semiorbicularis*
Cap dark brown, stem usually flattened
- - *N. platysperma*

Description of Species of Naucoria

1. *NAUCORIA PLATYSPERMA*. Cap 2-4 cm. wide, convex to almost flat, at first pale to dark brown, later dirty yellow, slightly sticky when moist. Flesh 2-4 mm. thick near the stem, pale tan to white. Gills 20-25 per cm. at the margin of the cap, 3-7 mm. wide, adnate, tan when young, dark brown when old, edge often tan. Stem 3-5 cm. long, 2-6 mm. thick, tan to brown, often flat and twisted, striate toward the top, hollow, tough and pliable. Microscopically, some of the spores often are somewhat flat and irregular. In groups of several on manure heaps, manured ground and grassy places.
2. *NAUCORIA SEMIORBICULARIS*. Cap 1-4 cm. wide, convex to almost flat, surface tan to yellow, darker in the center, slightly sticky when moist. Flesh 1-3 mm. thick at the stem, very pale tan. Gills 15-20 per cm. at the cap margin, 2-5 mm. wide, adnate or almost free, pale tan when young, rusty brown when old, edge sometimes delicately fringed with white. Stem 4-6 cm. long, 2-6 mm. thick, yellow to light brown, with a silky sheen, often striate, tough and pliable. Scattered

or in groups on the ground in lawns and grassy places. This is one of the most common small mushrooms in pastures and lawns, often appearing in the same places in some abundance year after year.

Genus PAXILLUS

The genus is characterized by brown spores, and by decurrent gills that may be peeled very easily from the cap. The genus has only a few species, Kauffman's "Agaricaceae of Michigan" describing only 5, of which the writer has found only 3 commonly.

Key to Species of Paxillus

1. Stem densely covered with dark brown hair
 - - *P. atrotomentosus*
 Stem not hairy - - 2
2. Gills tan, becoming dark brown when bruised
 - - *P. involutus*
 Gills golden yellow, prominently interveined
 - - *P. rhodoxanthus*

Description of Species of Paxillus

1. PAXILLUS ATROTOMENTOSUS. Edible. Cap 6-12 cm. wide, convex when young, later flat or depressed in the center, surface reddish brown or very dark brown, hairy when young, glabrous when mature; margin of young specimens inrolled, later incurved, often wavy. Flesh white, thick spongy or firm. Gills about 20 per cm. at the cap margin, 4-6 mm. wide, adnate or short decurrent, forked near the stem, sometimes forming a netlike arrangement on the stem, usually with veins between them where they are attached to the cap, tan to brown, separable from the cap. Stem central,

eccentric or lateral, 4-10 cm. long, 1-3 cm. thick, covered with short, dark brown hairs. Solitary or in clumps of a few on decayed logs, stumps and fence posts.

2. *PAXILLUS INVOLUTUS*. Edible. Cap 5-11 cm. wide, at first convex, then flat to depressed in the center, silky brown and some areas shiny, the remainder covered with darker flat scales; margin at first strongly inrolled and during dry weather remaining so. Flesh pale yellow, becoming brown where bruised, continuous with the interior flesh of the stem. Gills 20 per cm. at the cap margin, 5-8 mm. wide, tapering toward both ends, decurrent, light brown, becoming dark reddish brown where bruised, occasionally forked into 2, some often forming netlike connections on the stem, easily separable from the flesh of the cap. Stem 4-8 cm. long, 1-2.5 cm. in diameter at the top, cylindrical or somewhat irregular, tough, brown or streaked yellow and brown. Singly or in small groups of a few specimens on the ground or on very decayed wood.

3. *PAXILLUS RHODOXANTHUS*. Edible. Cap 4-9 cm. wide, convex when young and remaining so or becoming flat to depressed in the center; surface delicately hairy to glabrous, reddish yellow or reddish brown. Flesh pale yellow, thick, firm. Gills 12-16 per cm. at the cap margin, 4-7 mm. wide, decurrent, golden yellow, with prominent veins between adjacent gills where they meet the cap, occasionally forked, sometimes forming a netlike or porelike arrangement or near the stem. Stem 4-8 cm. long, 5-10 mm. thick, solid, reddish yellow toward the top, yellow toward the base, sometimes covered with minute reddish brown scales. Solitary or scattered on the ground in woods.

Genus PHOLIOTA

The genus is characterized by brown spores and a ring or annulus on the stem, although the ring is indistinct in some species, or present only in very young specimens just when the cap has separated from the veil that connects it to the stem. Most of the common species grow on wood, but a few of them grow on the ground. Most of those here described are edible, and some are considered to be very delicious, but the edibility of some is unknown.

Key to Species of Pholiota

1. Cap scaly - - 2
Cap smooth - - 9
2. Edge of gills beaded with white drops 1-2 mm.
in diameter - - *P. albocrenulata*
Edge of gills not beaded - - 3
3. Cap sticky when moist (dry specimens must be
soaked in water 10-15 minutes to determine
this) - - 4
Cap not sticky - - 5
4. Gills 8-12 mm. wide - - *P. adiposa*
Gills 3-5 mm. wide - - *P. squarrosoides*
5. Scales prominent, dense - - 6
Scales inconspicuous, appressed - - 7
6. Cap 5-10 cm. wide, yellow or reddish brown
- - *P. squarrosa*
Cap 1-3 cm. wide, brown - - *P. erinaceola*
7. Gills 3-4 mm. wide - - *P. confragosa*
Gills 5-10 mm. wide - - 8

-
8. Scales darker than surface of cap - - *P. muricata*
Scales white - - *P. destruens*
9. Ring soon disappearing - - 10
Ring persistent - - 11
10. Cap 2-6 cm. wide, white, pale yellow or pale brown, on the ground - - *P. praecox*
Cap 1.5-3.0 cm. wide, reddish tan in the center, paler toward the margin, on logs
- - *P. marginata*
11. Ring striate on the upper side, cap 0.5-3.0 cm. wide - - *P. rugosa*
Ring not striate - - 12
12. Cap 2-4 cm. wide, ring very narrow
- - *P. discolor*
Cap 5-10 cm. wide, ring broad and white
- - *P. caperata*

Description of Species of *Pholiota*

1. *PHOLIOTA ADIPOSA*. Edible. Cap 3-12 cm. wide, first hemispherical, later convex to campanulate, or flat with an umbo, chrome yellow to pale yellow, sticky or slimy when moist, usually with concentric rows of flat brown scales, sometimes with remnants of the veil hanging from the margin. Flesh pale yellow, 7-12 mm. thick near the stem, thinning abruptly to 3-5 mm. at the edge of the umbo. Gills 15-20 per cm. at the cap margin, 8-12 mm. wide, at first pale yellow, later dark brown, first adnate, then emarginate. Stem 5-15 cm. long, 8-15 mm. thick at the top, curved, tough and fibrous, yellow like the cap, scaly up to the annulus. Annulus thin and disappearing quickly. In dense clumps of several to a dozen specimens, all arising from the same point, on branch stubs of living hardwood trees and stumps and logs of hardwoods.

2. *PHOLIOTA ALBOCRENULATA*. Cap 3-12 cm. in diameter, convex to campanulate with an umbo, reddish brown in the center or all over, sometimes paler toward the margin, very sticky or slimy when moist and fresh, covered with flat scales that are dark when moist and whitish when dry and which usually are in concentric rows; margin of the cap extending a little past the gills when young, and remnants of the veil clinging to it as the cap expands. Gills 20-25 per cm. at the cap margin, 10 mm. wide near the stem, at first adnate, soon sinuate, grayish to almost white in young specimens, becoming reddish brown in mature plants, beaded with white droplets that are very obvious in moist weather but which may require a lens to detect in dry weather. Stem 6-12 cm. long, 7-10 mm. in diameter at the top, tapering slightly upward, covered with brown scales up to the annulus, white or faintly hairy above the annulus. Ring or annulus brown, narrow, inconspicuous, soon disappearing. Solitary or in small groups of a few specimens on rotten logs or living hardwood trees.
3. *PHOLIOTA CAPERATA*. Cap 5-10 cm. wide, at first oval, then campanulate; surface yellow or light brown, conspicuously wrinkled, when young often covered with delicate white hairs, glabrous when old. Flesh 4-9 cm. thick at the stem, white. Gills about 20-25 per cm. at the cap margin, 4-9 mm. wide, adnate or sinuate, first white, later pale brown, edge often wavy. Stem 7-12 cm. long, 1-2 cm. thick, dingy white, glabrous, solid. Annulus or ring near the middle of the stem, flared downward, white, persistent, tough. Scattered on the ground in coniferous or mixed woods.
4. *PHOLIOTA CONFRAGOSA*. Cap 2.5-6 cm. wide, convex or almost flat with a slight depression in the center, watersoaked reddish brown when moist, fading when dry to pale tan, densely covered with very tiny scales that are in-

dividually visible and can be rubbed off easily when the cap is moist, but appear as a fine pubescence when the cap is dry; the margin sometimes faintly striate in moist specimens. Flesh 2-3 mm. thick at the stem, colored like the cap, with a peculiar brittle texture like cold paraffin. Gills 20-30 per cm. at the cap margin, 3-4 mm. wide, reddish brown, adnate, broadest at the stem and tapering to a point at the margin. Stem 2-4 cm. long, 4-7 mm. thick at the top, slightly enlarged at the base, when fresh covered with silky white mycelium that can be rubbed off easily and soon disappears, reddish brown beneath this mycelium, hollow, fibrous. Annulus or ring thin, white or pale tan, when the veil first breaks the annulus sticks straight out from the stem like a disc, but it soon collapses and then is very inconspicuous, apparent only as a ridge about 5-8 mm. from the top of the stem. In groups on very decayed logs.

5. PHOLIOTA DESTRUENS. Cap 6-12 cm. wide, at first almost spherical with the margin inrolled, later slightly convex to flat, surface brown when watersoaked, yellow when dry, slightly sticky near the margin only, or not sticky at all, with 6 to 9 concentric rows of white, pointed, thin scales that are very flat and inconspicuous toward the center of the cap but more evident toward the margin. Sometimes remnants of the broken veil hang for a short time from the margin of expanding caps, but these soon dry up and disappear. Flesh 1-2 cm. thick near the stem, tapering gradually toward the margin, white when fresh, pale yellow where broken and dried, firm. Gills 20-25 per cm. at the cap margin, 5-10 mm. wide, adnate, in overmature specimens breaking away from the stem and sometimes appearing to be free from the stem, widest near the stem and tapering gradually toward the margin, gray when young, dark brown when mature. Stem 3-15 cm. long, 15-30 mm. thick at the top, enlarged near the base and then tapering rapidly downward from this

enlargement, at first covered with woolly white mycelium, later pale brown; solid, interior white or yellow except at the base, which is watersoaked and brown. Annulus or ring thin, soon disappearing. Scattered or in groups on decaying hardwood logs.

6. *PHOLIOTA DISCOLOR*. Cap 2-4 cm. wide, when young hemispherical with a flat top, later almost flat, when moist sticky and dark tan, becoming lighter in color as it dries and even in moist weather it may be bright golden yellow; the margin striate. Gills short decurrent, at first very pale tan, darker with maturity, the edge wavy when seen with a lens. Stem 4-6 cm. long, 3-8 mm. thick, pale brown, tough. Ring or annulus thin and persistent. Solitary or in groups of a few on decaying wood.
7. *PHOLIOTA ERINACEELLA*. Cap 1-2 cm. wide, hemispherical when young, later convex, brown, covered with conical or rounded scales that are very dense near the center of the cap and sparse toward the margin. Flesh 2-3 mm. thick, with a thin yellow layer just beneath the scales and a thicker, watersoaked, brown region below, fragile. Gills about 25 per cm. at the cap margin, 3-4 mm. wide near the stem, gradually narrowed to a point at the margin, pale brown when young, becoming darker at maturity, adnexed or adnate. Stem 2-3 cm. long, 2-3 mm. thick at the top, gradually thicker toward the bottom, yellowish brown, often without a ring but smooth from the top down to where the margin of the cap was attached and densely covered with conical scales from there to the base, fibrous, curved, sometimes with a small hollow in the center. Scattered or in clusters on very rotten wood of deciduous trees.

8. *PHOLIOTA MARGINATA*. Cap 1.5-3.5 cm. wide, first convex with a flat center, later flat with a small umbo; center shiny reddish tan, paler toward the margin, surface slightly sticky when moist, margin faintly striate. Gills adnate, sometimes separating entirely from the stem in age, at first pale yellow, later reddish tan to brown, 2-4 mm. wide, 25 per cm. at the cap margin. Stem 4-6 cm. long, 2-4 mm. thick, first pale tan, later brown, silky, brittle, the base enlarged, often several stems joined at the base. Annulus or ring paler than the stem, thin, soon collapsing and disappearing. Scattered or in groups on rotten logs.

9. *PHOLIOTA MURICATA*. Cap 3-5 cm. wide, convex to almost flat, covered with flat pointed scales, yellowish tan to brown, darker and the center and the scales darker than the rest of the surface. Gills 20-25 per cm. at the cap margin, 5-7 mm. wide, adnate to decurrent, first yellow, later rusty brown. Stem 2-5 cm. long, 3-5 mm. thick, curved, first solid, later hollow, hairy up to the annulus, light brown, sometimes eccentric. Annulus or ring quickly disappearing or remaining only as a ragged line around the stem. Solitary or in clumps of 2-5 on decaying hardwood logs.

10. *PHOLIOTA PRAECOX*. Edible. Cap 2-6 cm. wide, convex to flat, pale brown to white, slightly sticky when moist, smooth and glabrous. Flesh 3-8 mm. thick near the stem, white, soft. Gills 15-20 per cm. at the cap margin, 3-8 mm. wide, adnate or sinuate, first white, then gray, later grayish brown, edge white and delicately wavy when seen with a lens. Stem 4-8 cm. long, 3-7 mm. thick, cylindrical or tapering slightly downward, white or pale gray, slightly hairy near the top, solid, fibrous and silky shining within. Veil sometimes forming a fragile ring near the top of the stem, but this quickly disappears. Solitary or in groups on lawns, around cultivated plants, in pastures

and open woods.

11. *PHOLIOTA RUGOSA*. Cap 0.5-3 cm. wide, broadly conical when young, later flat with an umbo, surface yellowish brown when moist, yellow or pale tan when dry, margin slightly striate when moist, entire surface conspicuously wrinkled when dry. Flesh 1-2 mm. thick, colored like the cap. Gills 15-20 per cm. at the cap margin, 2-3 mm. wide, adnexed, pale yellow when young, later rusty brown, the edge white. Stem 3-5 cm. long, 1-3 mm. thick, sometimes slightly enlarged at the base, pale tan or yellowish, white mealy above the ring or annulus, covered with small scales below the ring, hollow. Ring or annulus just above the middle of the stem, tough, pale tan, striate on the upper side, dingy white beneath. Solitary or in groups on very rotten wood and moist ground in deciduous and mixed woods.
12. *PHOLIOTA SQUARROSA*. Edible. Cap 5-10 cm. wide, almost spherical when young, later convex to flat, yellow to reddish brown, covered with prominent, erect, pointed scales that usually are in concentric circles. Flesh 5-10 mm. thick near the stem, pale yellow. Gills 25 per cm. at the cap margin, 2-3 mm. wide, at first colored pale olive, later yellow, then rusty brown, adnexed to sinuate or slightly decurrent. Stem 5-15 cm. long, 5-15 mm. thick, tapering downward slightly, colored like the cap and covered with scales like those on the cap, as far up as the annulus, pale yellow to white and smooth above the annulus. Annulus or ring fairly heavy, soft, persistent, often parts of it hanging from the margin of the expanded cap. Usually in dense clumps of several to more than a dozen specimens arising from a common point on decaying hardwood trees, stumps and logs. It has a strong and somewhat unpleasant odor.

13. *PHOLIOTA squarrescens*. Cap 4-7 cm. wide, hemispherical and with in-rolled margin when young, later campanulate, pale yellow to pale reddish brown, sticky when moist, covered with small, pointed, erect, reddish brown scales that are smaller and more dense toward the center of the cap. Flesh 5-8 mm. thick near the stem, becoming abruptly thin about 2/3 the way to the margin, white, firm. Gills 25-30 per cm. at the cap margin, 3-5 mm. wide, pale olive or pale yellow when young, pale brown when mature, sinuate or short decurrent. Stem 7-11 cm. long, 8-12 mm. thick at the top, yellow to reddish brown and covered with rough, projecting scales up to the annulus, smooth and white above the annulus. Annulus prominent, persistent, near the top of the stem. In dense clumps of 10 to 30 specimens, all arising from a common point, on decaying hardwood logs.

PINK SPORED MUSHROOMS

Genus CLAUDOPUS

The genus has pink spores and either a lateral stem or no stem, resembling the genus *PLEUROTUS* of the white spored group, and *CREPIDOTUS* of the brown spored group.

Key to Species of Claudopus

1. Cap and gills yellow, odor pungent and disagreeable - - *C. nidulans*
 Cap white, gills pink to reddish, without any obvious odor - - *C. variabilis*

Description of Species of Claudopus

1. *CLAUDOPUS NIDULANS*. Cap 3-8 cm. wide, spatulate to reniform, narrowed to a stemlike base at the place of attachment, one cap often subdivided into several others, surface golden yellow to tan, covered with dense coarse hair, margin inrolled. Flesh thin, tough, pale yellow to white. Gills 25-30 per cm. at the cap margin, 2-4 cm. wide, decurrent to adnate, often branched near the base, golden yellow. The stemlike base usually is covered with white mycelium from where the gills end to the place of attachment to the wood on which it grows. It has a strong, pungent and disagreeable odor. In imbricate clumps on decaying hardwood.
2. *CLAUDOPUS VARIABILIS*. Cap 1-3 cm. wide, flat, irregularly circular or oval, surface hairy, white, margin, inrolled. Flesh

white, thin. Gills 10-15 per cm., 1-2 mm. wide, pink or reddish, radiating from the stemlike base. In small clumps on decaying wood.

Genus CLITOPILUS

The genus is characterized by pale pink spores, decurrent or adnate gills, fleshy or fleshy-fibrous stem, and growth on the ground.

Key to Species of Clitopilus

1. Cap slightly sticky when moistened - - *C. orcella*
Cap not sticky - - 2
2. Cap 1-2 cm. wide - - *C. micropus*
Cap 3 cm. or more wide - - 3
3. Gills long decurrent - - 4
Gills short decurrent - - 5
4. Cap depressed in the center or funnel shaped,
taste very bitter - - *C. novaboracensis*
Cap convex to flat, taste not bitter
- - *C. prunulus*
5. Cap grayish brown or dark watersoaked brown
- - *C. subvilis*
Cap white or nearly so - - 6
6. Usually caespitose, rare - - *C. caespitosa*
Solitary or scattered, often aborted, common
- - *C. abortivus*

Description of Species of *Clitopilus*

1. *CLITOPILUS ABORTIVUS*. Edible. Cap 3-12 cm. wide, at first hemispherical or convex with the margin inrolled, later convex, flat or shallow funnel shape, surface gray to tan, silky. Flesh 6-10 mm. thick near the stem rapidly becoming thinner toward the margin and usually disappearing where the margin begins to curve down, white, rather firm. The flesh has a definite and rather sharp odor suggestive of freshly ground wheat meal. Gills 5-8 mm. wide, 25-30 per cm. at the cap margin, decurrent for a few mm., gray when young, pale rose colored when mature. Stem 5-10 cm. long, 6-12 mm. thick at the top, gray and often delicately hairy at the upper end for 1 or 2 cm., white toward the base, the upper portion often striate, the interior white and definitely fibrous. Aborted specimens common and consisting of irregular to almost spherical clumps, usually mixed in among the normal specimens; these aborted specimens are malformed because they have been attacked by another fungus, but this does not affect their edibility. Scattered or in groups on the ground, usually under hardwood trees.
2. *CLITOPILUS CAESPITOSUS*. Cap 5-15 cm. wide, convex when young, later flat or depressed in the center, margin first inrolled, later curved upward and split, surface white or pale gray when young, often pale tan when old, watersoaked in wet weather, with a silky sheen when dry. Flesh pale gray, then. Gills 30 or more per cm. at cap margin, 2-5 mm. wide, short decurrent, white when young, pale pink when old, sometimes the edge delicately fringed. Stem 3-7 cm. long, 5-12 mm. thick, sometimes tapering slightly downward, pale gray or white. Usually in clumps, on the ground. The spore print on white paper, or on glass, appears pale pink, but on black paper it appears white, and

the fungus thus could be confused with a *Clitocyba*.

3. *CLITOPILUS MICROPIUS*. Cap 1-2 cm. wide, depressed in the center, the margin curved down, white to gray, silky, a few faint concentric zones on the margin. Gills 25-30 per cm. at cap margin, up to 2 mm. wide, very short decurrent, narrowed to a point at both ends. Stem 1-2 cm. long, 2-3 mm. thick, delicately hairy, rather tough, pale gray with woolly white mycelium at the base. Scattered or in dense groups, on the ground in open or sparsely wooded places.

4. *CLITOPILUS NOVABORACENSIS*. Cap 3-6 cm. wide, slightly convex, flat, or funnel shape, ivory white to pale bluish or brownish gray, shiny when dry, with fine concentric wrinkles, margin inrolled, sometimes faintly zoned. Flesh up to 1 cm. thick at the stem, tapering gradually toward the margin, white, pliable. Gills 30 per cm. at the cap margin, 1-2 mm. wide, rather long decurrent, often forming a netlike arrangement on the stem, white to gray, becoming bluish gray where bruised, easily peeled from the cap. Stem 4-6 cm. long, 3-8 mm. thick, white to grayish tan, glabrous or finely hairy, the outside tough, the interior spongy, base covered with woolly white mycelium. The taste is very bitter and disagreeable. The spores are so pale pink that a rather heavy deposit of them is needed, preferably on white paper or on glass, to make sure of their color. Usually in groups, sometimes of hundreds of specimens, on the ground under conifer trees.

5. *CLITOPILUS ORCELLA*. Edible. Cap 4-12 cm. wide, convex when young, flat or depressed in the center when old, surface white to pale yellow, sticky when moist, margin often wavy and lobed. Flesh white. Gills 25-30 per cm., 1-4 mm. wide, long decurrent, white when young, pink when old. Stem 2-6 cm. long, 4-10 mm. wide, covered

with minute hairs, sometimes slightly eccentric. This species resembles *Clitopilus prunulus* except for the sticky cap, but in dry weather the cap must be moistened to detect this. On the ground or on moss in moist places in deciduous woods.

6. *CLITOPILUS PRUNULUS*. Edible. Cap 5-12 cm. wide, first convex, later almost flat, surface white to gray, not sticky when moist, margin decurved and often somewhat wavy. Flesh white. Gills about 20 per cm. at the cap margin, 1-4 mm. wide, long decurrent, white when young, later pink. Stem 3-8 cm. long, 5-15 mm. thick at the top, tapering upward, striate, often slightly woolly at the base. Scattered on the ground in open deciduous woods.

7. *CLITOPILUS SUBVILIS*. Cap 2.5-4 cm. wide, slightly convex, with either a low umbo or a shallow depression in the center, watersoaked brown when moist, translucent so that the gills can be seen from above as dark lines, grayish brown and with a silky sheen when dry. Flesh 1-2 mm. thick at the stem, colored like the cap surface. Gills 12-16 per cm., 4-7 mm. wide, widest near the stem, first adnate, later decurrent, gray when young, then tinged red from the spores, which in mass are rather dark red. In groups on the ground in conifer and mixed woods.

Genus *ENTOLOMA*

The genus is characterized by definitely pink spores, adnexed or sinuate gills, and a fleshy stem that does not separate from the cap. Several of the species are reputed to be poisonous, and the edibility of most of the others has not been adequately tested; since most of the species are relatively difficult to identify with certainty it probably is wiser to avoid eating any of them.

Key to Species of Entoloma

1. Gills 3-5 mm. wide - - *E. sericatum*
Gills 4-12 mm. wide - - 2
2. Edge of gills not fringed - - *E. rhodopolium*
Edge of gills delicately fringed - - *E. clypeatum*

Description of Species of Entoloma

1. *ENTOLOMA CLYPEATUM*. Edible. Cap 3-10 cm. wide, campanulate, dark brown when moist, grayish brown to almost white when dry, often streaked with darker fibers, margin often wavy. Flesh thin, white. Gills 15-20 per cm., 4-10 mm. wide, first adnexed, later sinuate, the edge delicately serrate, white when young, pale rose when mature. Stem 4-6 cm. long, 6-12 mm. thick, sometimes irregularly flat, brittle, white, delicately hairy near the top. Scattered or in clumps on low ground in deciduous woods and around stumps in lawns.
2. *ENTOLOMA RHODOPOLIUM*. Cap 4-10 cm. wide, campanulate to flat; surface when wet pale watery brown, translucent toward the margin, and slightly sticky, when dry it is glassy and shiny; margin first incurved, later decurved, wavy. Flesh watery white, 4-7 mm. thick at the stem. Gills 12-18 per cm. at the cap margin, 7-12 mm. wide, widest near the stem, first adnate, later sinuate, almost white when young, later deep pink. Stem 4-10 cm. long, 6-12 mm. thick, white or pale gray, striate, fibrous, brittle, tapering gradually either up or down, hollow at maturity, the interior wall of the hollow portion covered with recurved scales. The odor of the crushed flesh often is decidedly like fresh wheat meal, the taste slightly so or sometimes unpleasant. Solitary or in groups or clumps on the ground in deciduous or mixed woods.

3. *ENTOLOMA SERICATUM*. Cap 3-8 cm. wide, campanulate when young, later flat with a low umbo, sometimes depressed in the center; surface grayish brown when moist, pale tan and shiny when dry, margin faintly striate because the flesh there is thin and, when wet, translucent so that the gills can be seen as faint dark lines. Flesh thin, pale tan. Gills 25-30 per cm. at the cap margin, 3-5 mm. wide, gradually narrowed toward the margin, first adnexed, adnate, or short decurrent, later sinuate, white when young, pale pink when mature. Stem 5-10 cm. long, 5-10 mm. thick, ven or tapering slightly downward, curved, white and shiny, fibrous, brittle, hollow at maturity, the inner walls of the hollow covered with small recurved shreds. Odor of crushed flesh like that of fresh wheat meal. Scattered or in groups on the ground in woods.

Genus *PLUTEUS*

The genus is characterized by pink or pinkish tan spores, free gills, and the stem easily separable from the cap. Most of the species are distinguished from one another by microscopic characters of the cystidia on the gills, but those here included can be separated with certainty from one another, if not from certain other species in the genus, on the basis of macroscopic characters.

Key to Species of *Pluteus*

1. Cap pale tan to brown silky shining, rarely faintly scaly, common - - *P. cervinus*
Cap white, covered with fine hairs or tufts of hair - - *P. tomentosulus*
Cap dark brown, with radial ridges in the center - - *P. nanus*
Cap bright lemon yellow - - *P. leoninus*

Description of Species of *Pluteus*

1. *PLUTEUS CERVINUS*. Edible. Cap 5-14 cm. wide, campanulate, convex or flat, sometimes with a broad umbo, in overmature specimens the margin upraised; surface silky fibrous, white, tan, or brown, cuticle easily peeled off. Flesh 5-10 mm. thick at the stem, becoming gradually thinner, white, soft. Gills 10-15 per cm. at cap margin, 1-2.5 cm. wide, free, first white and remaining so for some time, later flesh color to tan. Stem 6-15 cm. long, 0.6-2.5 cm. thick at the top, tapering slightly either upward or downward, white toward the top, tan below, rind brittle-tough, the interior spongy; the top of the stem has a rather flat, subhemispherical head which extends almost through the cap to the cuticle on top, and which can be separated easily from the flesh of the cap. Solitary or scattered on decaying wood, sawdust piles and on the ground.

2. *PLUTEUS NANUS*. Cap 2-4 cm. wide, convex, dark brown and appearing velvety when young, yellowish brown when old, with inconspicuous, irregular ridges radiating out 4-6 mm. from the center of the cap; when fresh and moist the cap is somewhat translucent toward the margin and the gills there may be seen from the top as faint dark striations. Flesh pale brown, thin. Gills free, 20-25 per cm. at the cap margin, 4-6 mm. wide, white when young, soon tinged pink. Stem 2-4 cm. long, 3-5 mm. thick, white, curved, striate. Usually singly on the sides of decayed logs in swamps.

3. *PLUTEUS TOMENTOSULUS*. Cap 3-6 cm. wide, slightly convex, or flat with an umbo, surface covered with short, fine, flat silky scales or delicate tufts of fine hairs. Flesh 2-4 mm. thick at the stem, disappearing near the margin,

white, soft and limp. Gills 10-20 per cm. at the cap margin, 4-8 mm. wide, first white, then salmon colored or reddish tan. Stem 5-8 cm. long, 4-7 mm. thick at the top, enlarged into a small bulb at the base, white, faintly striate, covered with short, fine hairs. Solitary or scattered on decayed wood and on the ground.

Genus VOLVARIA

The genus is characterized by definitely pink spores, and a thick, tough volva that encloses the entire young plant and which remains as a torn cup at the base of the stem. A single species is described here.

1. VOLVARIA BOMBYCINA. Edible. Cap 8-20 cm. wide, at first conical or egg-shape, later broad conical to campanulate or convex, white, covered with dense small tufts or scales of white mycelium that give it a silky sheen. Flesh thin, white. Gills 20-25 per cm. at the cap margin, 8-12 mm. wide, free, first white and remaining so for some time, later rather bright pink or flesh color. Stem 5-15 cm. long, 1-1.5 cm. thick at the top, tapering upward, tan at the base, the remainder white, solid. Volva white to tan, tough and leathery, sticky, very obvious. Solitary or scattered in in groups of up to a dozen on living trees and logs of hardwoods, principally box elder, maple, and beech.

PURPLE-BROWN SPORED MUSHROOMS

Genus AGARICUS

The genus, in Europe known by the generic name of PSALLIOTA, is characterized by deep purple brown spores, free gills, a ring or annulus on the stem, and the stem easily separable from the cap. All species are edible and of excellent flavor, and one of them, *Agaricus campestris*, var. *bisporiger*, or *Agaricus bisporiger*, is the mushroom raised commercially in Europe and America.

Key to Species of Agaricus

1. Growing in woods and groves - - 2
 Growing in lawns, pastures, and open fields
 - - 6
2. Flesh turning red when broken
 - - *A. hemorrhodaria*
 Flesh not turning red when broken - - 3
3. Cap 2-5 cm. wide - - *A. diminutiva*
 Cap more than 5 cm. wide - - 4
4. Surface of cap white or nearly so, scales absent or very small and inconspicuous
 - - *A. abruptibulba*
 Surface of cap brown to black, obviously scaly
 - - 5
5. Center of cap and the scales dark gray or black
 - - *A. placomyces*
 Center of cap reddish brown, scales pale brown
 - - *A. subrufescens*

6. Gills about $1/3$ as wide as flesh is thick, ring often double, with the upper and lower parts definitely separated - - *A. rodmani*
Gills $1/2$ or more as wide as flesh is thick, ring single - - 7
7. Entire cap of young specimens and the center of the cap of old specimens covered with dark scales - - *A. placomyces*
Cap not covered with dark scales - - 8
8. Gills white when the cap opens, surface of cap and stem becoming yellow where bruised
- - *A. arvensis*
Gills definitely pink or brown when the cap opens, surface not becoming yellow where bruised - - *A. campestris*

Description of Species of *Agaricus*

1. *AGARICUS ABRUPTIBULBA*. Edible. Cap 8-15 or 20 cm. wide, at first hemispherical to almost cylindrical, later convex, then flat, surface silky white, becoming pale yellow where bruised. Flesh 8-15 mm. thick, rather firm, white, turning yellow where bruised, especially just beneath the cuticle. Gills 20-25 per cm. at the margin, 8-12 mm. wide, free, white until the cap begins to expand, then pink, finally dark brown. Stem 7-12 cm. long, 1-1.5 cm. thick at the top, thicker toward the base and ending in an abrupt bulb, at first white, later yellowish, hollow, with a rather thick annulus. In scattered groups or fairy rings on the ground in deciduous woods.
2. *AGARICUS ARVENSIS*. Edible. Cap 5-20 cm. wide, convex, or flat with the margin decurved; surface white when young, pale yellow in age or when bruised, silky, sometimes with small flat scales. Flesh 8-15 mm. thick, first

white, later yellowish. Gills 20-25 per cm. at the cap margin, 6-12 mm. wide, free, at first white and remaining so longer than in other species, pink for a short time, then blackish brown. Stem 5-20 cm. long, 1-3 cm. thick, white, yellow where bruised, silky and shiny above the annulus. Annulus prominent, double; that is, composed of 2 definite layers, the under side cracked radially into large patches. Solitary or scattered on the ground in fields, lawns and pastures, or in open grassy woods.

3. *AGARICUS CAMPESTRIS*. Edible. Cap 4-10 cm. wide, at first almost globose, hemispherical when the veil breaks, convex to nearly flat at maturity; surface white to tan, silky or covered with small flat scales. Flesh 1-2 cm. thick at the stem, firm, white. Gills 15-20 per cm. at the cap margin, 6-12 mm. wide, free but close to the stem, at first white, usually pink when the veil breaks, dark purple brown at maturity. Stem 5-10 cm. long, 1-2 cm. thick, the base occasionally enlarged slightly. Annulus white, thick, single, sometimes flaring out like a skirt, sometimes drying and disappearing quickly. Scattered or in groups or fairy rings in lawns, grassy fields and on compost heaps.

4. *AGARICUS DIMINUTIVA*. Cap 2-5 cm. wide, convex or almost flat, surface pale pinkish tan or nearly white, center reddish brown, the surface layer or cuticle breaking up into numerous small flat reddish brown scales that are more numerous toward the center. Flesh white, fragile, 3-5 mm. thick near the stem. Gills free, first white, then pink, soon gray brown and finally dark brown, 15-20 per cm. at the cap margin, 5-7 mm. wide. Stem 2.5-5 cm. long, 4-7 mm. thick at the top, uniform in diameter or tapering upward slightly, base sometimes slightly enlarged, white above the annulus, white or yellowish below. Veil thin, white, forming an inconspicuous ring that soon

disappears. Scattered on the ground in woods.

5. *AGARICUS HEMORRHODARIA*. Edible. Cap 5-12 cm. wide, at first oval, later campanulate to flat, surface covered with small brown flat scales toward the center, white and glabrous toward the margin. Flesh white, becoming reddish when broken or bruised. Gills about 20 per cm. at the cap margin, 8-15 mm. wide, free, first white, soon pink, then dark brown. Stem 5-12 cm. long, 8-15 mm. thick at the top, tapering slightly upward, white when young, tan when old, hollow at maturity. Scattered or in groups on the ground, usually in deciduous or mixed woods.
6. *AGARICUS PLACOMYCES*. Edible. Cap 5-12 cm. wide, at first oval, later convex to flat, sometimes with a small umbo; surface dark brown to black in the center and covered with rather prominent dark brown scales except at the margin. Flesh white. Gills 20 per cm. at the cap margin, 5-10 mm. wide, free, first white, soon pink, then dark brown. Stem 6-12 cm. long, 4-10 mm. thick at the top, tapering upward, enlarged slightly at the base, white, often yellowish toward the base, hollow when mature. Annulus prominent, white, in two layers. Solitary or scattered on the ground under trees on lawns, parkways and in the woods.
7. *AGARICUS RODMANI*. Edible. Cap 4-10 cm. wide, first cylindrical to hemispherical and flattened on top, later convex, then almost flat, the margin at first extending definitely past the ends of the gills; surface white when young, pale yellow when old, silky. Flesh white, thick. Gills 20 per cm. at the cap margin, 4-6 mm. wide, free but almost touching the stem, first white, then pink, later dark brown. Stem 2-7 cm. long, 1-3 cm. thick at the top, usually tapering downward, white, mealy above the annulus. Annulus at or below the middle of the stem, inconspicuous, usually wide, in

two layers one of which extends upward and the other downward. Often the cap expands partly while it is still beneath the ground, then the stem elongates, pushing up the cap with soil on top of it; sometimes their presence, as they start to push up, is indicated by a mound of soil raised above them. Solitary or in clumps on the ground in lawns and other grassy places.

8. *AGARICUS SUBRUFESCENS*. Edible. Cap 5-15 cm. wide, at first hemispherical, then convex, later flat or with a small umbo; surface first uniform silky born, remaining smooth in the center, toward the margin becoming covered with small flat brown scales, white between the scales. Flesh thin, white. Gills about 20 per cm. at the cap margin, 5-8 mm. wide, free, first white, then pink, later dark brown. Stem 6-15 cm. long, 1-1.5 cm. thick at the top, tapering slightly upward, enlarged into a rounded bulb at the base, white, glabrous above the annulus, scaly below. Annulus prominent, often hanging like a voluminous, flaring skirt around the stem, white above, brown below. Usually in groups, on the ground in deciduous woods.

Genus *HYPHOLOMA*

The genus has violet color to dark purple brown spores, the veil is thin and breaks at the stem, fragments of it remaining on the margin of the expanding cap for a short time but soon disappear, the gills are attached to the stem, and the stem is continuous with and does not separate readily from the flesh of the cap.

Key to Species of *Hypholoma*

1. Flesh of cap 1-2 mm. thick, cap white or pale tan when young, often purplish when old
- - *H. incertum*
Flesh thicker - - 2
2. Cap reddish brown, glabrous - - *H. sublateritium*
Cap yellowish brown, hairy or scaly
- - *H. velutinum*

Description of Species of *Hypholoma*

1. *HYPHOLOMA INCERTUM*. Edible. Cap 2.5-8 cm. wide, oval when young, broad conical, convex or flat when mature, at first pale tan, later almost white, when wet the cap often becomes translucent and purplish, and sometimes there are minute white scales on the cap; margin or the entire cap radially striate. In newly expanded specimens pieces of the veil remain attached as scallops to the margin of the cap, but these usually disappear quickly. Flesh 1-2 mm. thick, white or tan. Gills adnate, then separating from the stem, first white, later pale to dark purple, edge minutely fringed, 20 per cm. at the cap margin, 4-7 mm. wide. Stem 4-11 cm. long, 3-8 mm. thick at the top, tapering upward, white, fibrous, hollow. Sometimes portions of the veil remain attached to the stem as an annulus. Scattered or in dense groups on the ground around decaying stumps or above decaying tree roots. It is common in lawns and boulevards as well as in the woods.
2. *HYPHOLOMA SUBLATERITIUM*. Edible. Cap 3-11 cm. wide, convex to flat, reddish brown in the center, paler toward the margin. Flesh 4-8 mm. thick near the stem, becoming abruptly thin 1/3 to 1/2 the way to the margin, pale

yellow. Gills 20-25 per cm., 2-6 mm. wide, adnate, first pale gray, then grayish brown, purple brown when mature, edge white when seen with a lens. Stem 6-12 cm. long, 3-12 mm. thick, even in diameter, curved, bottom part colored like the cap, the upper part paler, smooth or with flat scales, solid. Scattered or in dense clumps with numerous stems arising from the same place, on decaying stumps and on the ground around them.

3. *HYPHOLOMA VELUTINUM*. Edible. Cap 3-10 cm. wide, convex to flat, with a broad umbo, yellowish brown, darker in the center, hairy when young, delicately scaly at maturity. Flesh watery tan. Gills 25-30 per cm. at cap margin, 3-8 mm. wide, adnate or sinuate, pale yellow when young, later purple brown, the edge white and in wet weather often beaded with drops of liquid. Stem 2-8 cm. long, 4-10 mm. thick, light brown and delicately scaly up to where the veil is attached, white above. Remnants of the veil remain for a short time on the cap margin. Solitary, scattered or in clumps on low moist ground in woods.

Genus *PSATHYRA*

The stem is hollow and very brittle, the margin of the young cap is straight, the cap rather watery when fresh and becoming lighter in color as it dries, and the spores deep purple brown. A single species is described.

1. *PSATHYRA UMBONATA*. Cap 2-4 cm. wide, first hemispherical, later conical to convex, dark translucent brown when moist, pale tan when dry, the margin slightly paler than the center and with many delicate dark striations (the top edges of the gills seen through the thin cap) extending $\frac{2}{3}$ the way to the center. Flesh 1-2 mm. thick at the center, gradually thinner toward the

margin, brown when moist, almost white when dry. Gills about 20 per cm. at the cap margin, 4-6 mm. wide, attached to the stem the full width of the gills at first, later partially separating from the stem, many very short gills at the margin, white or very pale tan when young, later purple brown, the edge sometimes delicately fringed with white. Stem 4-12 cm. long, 2-4 mm. thick, tapering slightly upward, white or nearly so, shiny, usually hollow, fibrous and brittle. Solitary or in clumps on or near very rotten wood in moist places and swamps.

Genus PSILOCYBE

The spores are purple brown, the margin of the young cap incurved, the gills adnexed to short decurrent, the stem rather fragile and brittle and the whole plant small and delicate. Only a single species is included.

1. *PSILOCYBE FOENISECII*. Cap 1-2.5 cm. wide, hemispherical or conical when young, later campanulate to convex; surface gray brown when moist, tan when dry and with a metallic luster. Flesh 1-2 mm. thick, pale tan, soft and pliable. Gills 15-20 per cm. at cap margin, 3-5 mm. wide, adnate or sinuate, mottled dark purple brown, edge white. Stem 4-8 cm. long, 2-3 mm. thick pale tan or brown, delicately hairy at the top, otherwise glabrous, hollow, fragile. Scattered or in dense clumps, sometimes in small fairy rings, on the ground in lawns, pastures and open grassy woods.

Genus STROPHARIA

The genus has purple brown spores, a ring or annulus, the gills are adnate in young specimens but may break away from the stem at maturity, the stem is not separable from the cap, and the cap of most species is sticky when fresh and moist.

Key to Species of Stropharia

1. Cap green, with white scales toward the margin,
very sticky - - *S. aeruginosa*
Cap pale yellow or white - - 2
2. Ring wide, striate above, edge of cap often
scalloped, growing on grassy ground
- - *S. coronilla*
Ring narrow, edge of cap not scalloped, usually
growing on dung - - 3
3. Cap 1-4 cm. wide, hemispherical to convex
- - *S. semiglobata*
Cap 3-8 cm. wide, convex to nearly flat
- - *S. stercoraria*

Description of Species of Stropharia

1. *STROPHARIA AERUGINOSA*. Edible. Cap 3-7 cm.
wide, convex to flat,
surface covered with a sticky, light green layer
then can be peeled off, often with white scales to-
ward the margin; cuticle beneath the layer of slime
yellowish brown or brown, easily removed. Flesh
3-6 mm. thick white to gray. Gills about 20 per
cm., 3-7 mm. wide, adnate or sinuate, white when
young, soon grayish brown, later dark purple brown,
edge white. Stem 3-7 cm. long 5-12 mm. thick,
cylindrical, often curved, pale greenish blue,

usually covered with small scales below the ring, smooth above the ring, soft, hollow. Ring near the top of the stem, usually inconspicuous, often almost disappearing. Scattered or in groups on the ground or on sawdust piles in woods. Kauffman in "Agaricaceae of Michigan" states that this species is said to be poisonous, but Gussow and Odell, in "Mushrooms and Toadstools" state: " - - one of us (W.S. Odell) has eaten quantities of it with relish and without the slightest inconvenience" and so it apparently is quite edible.

2. STROPHARIA CORONILLA. Cap 2-5 cm. wide, convex, surface slightly sticky when moist, shiny when dry, pale yellow or white, glabrous, remains of veil often hanging from the margin. Flesh 2-6 mm. thick near the stem, white, soft but firm. Gills about 15-20 per cm. at the cap margin, 3-7 mm. wide, adnexed or sinuate, grayish purple when young, very dark purple brown when mature, edge white. Stem 3-7 cm. long, 2-7 mm. thick, cylindrical or tapering slightly upward, white, fibrous or shiny below the annulus, often delicately scaly above the annulus, hollow when mature. Ring small but persistent, sometimes rather far from the top of the stem, with delicate ridges on the upper side. Solitary or scattered on the ground in lawns, pastures and grassy woods.

3. STROPHARIA SEMIGLOBATA. Edible. Cap 1-4 cm. wide, hemispherical to convex; surface sticky when fresh and moist, yellow, shiny when dry, glabrous. Flesh 2-4 mm. thick near the stem, becoming gradually thinner toward the margin, white or pale tan, soft. Gills 12-15 per cm. at the cap margin, 3-8 mm. wide, adnate or sinuate, first light gray, then grayish tan, later dark purple, edge white. Stem 6-10 cm. long, 2-5 mm. thick, cylindrical or enlarged into an oval bulb at the base, pale yellow, sticky when young, smooth, brittle, hollow. Annulus small and inconspicuous, some-

times disappearing with age. Solitary or scattered on manure and compost heaps, manured ground, and grassy places.

4. STROPHARIA STERCORARIA. Cap 3-8 cm. wide, convex with a broad umbo, pale yellow, sticky in moist weather. Flesh almost white, 5-10 mm. thick near the stem, 1-2 mm. thick at the margin. Gills about 15 per cm. at cap margin, 7-14 mm. wide, short decurrent or adnexed, grayish brown or olivaceous, edge white. Stem 6-10 cm. long, 4-8 mm. thick, enlarged toward the base, yellowish below the annulus, white above, fibrous inside. Annulus inconspicuous, collapsing on the stem, sometimes striate on the upper side as the cap expands. Scattered or in groups on manure and compost piles and on manured ground.

BLACK SPORED MUSHROOMS

Genus COPRINUS

The genus is characterized by black spores and the conversion of cap and gills into liquid as the plants mature. The gills are very close together in young caps, being separated only by microscopic pegs that grow out from the gill surfaces; they liquify from below upwards, and the spores mature and are liberated just ahead of the zone of liquifaction, many of them being trapped in the liquid and giving it the black color.

Key to Species of Coprinus

1. Growing on the ground or on wood - - 2
 Growing on dung - - 6
2. Gills 3-4 mm. wide - - 3
 Gills 8-15 mm. wide - - 4
3. Caespitose, caps at first tan and glabrous
 - - *C. micaceus*
 Scattered or solitary, cap at first white and
 scaly - - *C. stercorarius*
4. Cap white, with prominent shaggy brown scales
 - - *C. comatus*
 Cap gray, striate, delicately or not at all
 scaly - - 5
5. White rhizomorphs extending from the base of
 the stems into the decayed wood or soil,
 uncommon - - *C. quadrifidus*
 Without rhizomorphs, common - - *C. atramentarius*

6. Stem with an inconspicuous volva at the base
- - *C. sterquilinus*
Stem without a volva - - 7
7. Cap 2-6 cm. wide, scaly when young, silky when
mature - - *C. fimetarius*
Cap 0.5-2.0 cm. wide - - 8
8. Cap with scattered scaly patches of mycelium
on the surface, growing on fresh horse dung
- - *C. radiatus*
Cap without scaly patches, growing on partially
decomposed horse dung - - *C. ephemereus*

Description of Species of *Coprinus*

1. *COPRINUS ATRAMENTARIUS*. Edible. Cap 2-7 cm.
wide, at first conical
to egg shape, later broadly conical and the margin
often splitting into lobes, surface gray with a
darker center, silky or mealy, sometimes covered
with minute scales, striate or delicately furrowed.
Gills 20 to 30 per cm. at the cap margin, 8-15 mm.
wide, free, first white, soon black. Stem 6-12 cm.
long, 8-15 mm. thick, uniform in diameter, white
and shiny above the faint annulus, slightly rough
or scaly below. Annulus remaining only as a faint
irregular, narrow ring around the stem, closer to
the base than to the top of the stem. In dense
clumps on and around decaying hardwood stumps.
2. *COPRINUS COMATUS*. Edible. Cap at first cylin-
drical or narrow conical,
6-15 cm. long, 2.5-5 cm. wide, later broadly conical
and radially split; surface of young specimens nearly
white, later tan or purplish tan with prominent
scales that sometimes are arranged concentrically,
white between the scales. Flesh 1 mm. or less
thick, white, fragile. Gills 25-30 per cm., 6-15
mm. wide, free, first white, soon pink, then black

and becoming liquid. Stem 8-3.5 cm. long, 6-15 mm. thick at the top, tapering slightly upward, white, smooth or delicately scaly, brittle. Ring sometimes present, thin, soon disappearing. Solitary, scattered or in clumps of a dozen or more specimens on the ground in lawns, parks, open fields and along roadsides.

3. *COPRINUS EPHEMEREUS*. Cap 1-2 cm. wide, first elongate oval, later campanulate to nearly flat, striate or delicately furrowed when young, with narrow prominent folds when old, tan to reddish brown in the center, paler toward the margin. Gills so narrow as to appear only as raised lines, first white, later black and liquifying. Stem 3-6 cm. long, 1-2 mm. wide, white, hollow, very fragile. On manure heaps and manured ground.

4. *COPRINUS FIMETARIUS*. Cap 2-5 cm. wide when expanded, first elongate oval, then broadly conical with the margin curved upward and split, brown in the center, gray elsewhere, at first covered with white scales, later naked, radiately furrowed. Gills free, very narrow, becoming wavy, black before the cap expands, liquifying quickly. Stem 10-15 cm. long, 4-6 mm. thick, hollow, fragile, white, scaly, slightly enlarged at the base. Solitary or in groups on manure heaps, the caps usually appearing in the evening and maturing before morning.

5. *COPRINUS MICACEUS*. Edible. Cap 2-6 cm. wide, first oval, then conical to campanulate with margin curved upward, with narrow striations or prominent furrows from the edge $\frac{2}{3}$ the way to the center, often covered with tiny glistening particles. Gills about 20 per cm. at cap margin, 3-4 mm. wide, first white, then tan, later black and liquifying. Stem 5-10 cm. long, 4-8 mm. thick, white, silky, brittle, with a narrow

hollow. In dense clumps on the ground at the base of living trees or around decaying stumps. Often clumps appear several times a year around the same stump, and may continue to do so for many years

6. *COPRINUS QUADRIFIDUS*. Cap 2-5 cm. long before expanding and almost

cylindrical, broad conical to campanulate when expanded, surface covered with a layer of mycelium that breaks up into scales and falls off, 4-8 cm. wide when expanded, white or gray, finely striate. Gills 20-30 per cm., 8-15 mm. wide, free, white when young, soon black. Stem 6-12 cm. long, 8-12 mm. thick, hollow, white, brittle, at first scaly like the cap and with a ring that soon disappears. Conspicuous white cords of mycelium, rhizomorphs, extend from the base of the stems into the wood or ground on which it grows. In dense clumps on or near decaying hardwood logs and stumps.

7. *COPRINUS RADIATUS*. Cap 5-15 cm. wide, at first elongate oval, later campan-

ulate to flat, the margin upraised; surface with deep radial furrows, covered with scattered scaly patches of mycelium, brown in the center, gray toward the margin, with sparse short hairs. Gills 6-10 per cm., up to 1 mm. wide, free, first white, soon black and liquifying. Stem 2-6 cm. long, 1-2 mm. wide, white, hollow, very fragile, sparsely covered with short hairs. Common on dung of horses and some other herbivores. It can be raised, even in winter, by obtaining fresh horse dung, putting it in a container where it will remain moderately moist, and keeping it for a couple weeks, and thus serves as good classroom material.

8. *COPRINUS STERCORARIUS*. Cap at first cylindrical, 1.5-2.5 cm. high, 1-1.5

cm. wide, later conical, then campanulate, surface white and covered with small white scales that disappear within a few hours, then grayish tan with a

tan umbo, finely striate from margin to umbo, margin splitting as cap expands. Flesh 1 mm. or less thick, gray. Gills 15-20 per cm. at cap margin, 2-3 mm. wide, narrowly adnexed, first white, soon black and liquifying. Stem 5-10 cm. long, 2-3 mm. wide at the top, tapering upward, usually with a small bulb at the base, white, shiny, hollow, fragile. Scattered on the ground, decaying wood and manure.

9. *COPRINUS STERQUILINUS*. Edible. Cap 4-6 cm. wide when expanded, at first elongate oval, later narrow to broad conical, finally flat with the margin recurved, light brown in the center, otherwise white, surface at first silky, later rather prominently scaly, radial furrows extending 1-2 cm. in from the margin. Gills free, narrow, soon black and liquifying. Stem 10-15 cm. long, 4-7 mm. thick, tapering upward, the base slightly enlarged and surrounded by an inconspicuous volva. It somewhat resembles a small *Coprinus comatus*, but is less scaly. Scattered and in groups on manure heaps, manured ground, and straw.

Genus *PANAEOLUS*

The genus has black spores, narrowly adnate gills, and the margin of the cap is smooth, not striate. Only two species are common.

Key to Species of *Panaeolus*

1. Cap 3-8 cm. wide, stem solid, 5-10 mm. thick
 - - *P. solidipes*
 - Cap up to 4 cm. wide, stem hollow
 - - *P. retirugis*

Description of Species of *Panaeolus*

1. *PANAEOLUS RETIRUGIS*. Cap 1.5-4 cm. wide, oval to conical when young, later hemispherical to convex, often with an umbo; surface dark gray when moist, tan or pale yellowish gray to silvery when dry, sometimes brown on the umbo and paler toward the margin, smooth or the center covered with a network of irregular ridges, occasionally the surface breaking up into large scales; sometimes remains of the veil hanging from the margin. Flesh 1-2 mm. thick, pale gray or white. Gills 16-20 per cm. at the cap margin, 3-6 mm. wide, adnate or almost free, first white, later mottled dark gray or black, edge white. Stem 5-12 cm. long, 2-5 mm. thick, cylindrical, pale gray or tinged with red or purple, darker toward the bottom, when young covered with short hairs that give it a frosty appearance, hollow, fragile, the base slightly enlarged and covered with white mycelium. Rarely a narrow black annulus is present above the middle of the stem. Solitary, scattered or in groups on manure heaps and manured lawns and fields. Kauffman in "Agaricaceae of Michigan" lists it as "suspected", but states that it is not poisonous, and Thomas, in "Field Book of Common Gilled Mushrooms" quotes Murril to the effect that it is of good flavor and edible, although an extract of it was found fatal to guinea pigs.
2. *PANAEOLUS SOLIDIPIES*. Cap 4-8 cm. wide, hemispherical to convex, white or pale yellow, smooth when young and fresh, the surface layer of some specimens cracked concentrically or cracked into irregular polygonal areas from a few millimeters to a centimeter across, slightly sticky when moist. Flesh 3-4 mm. thick, becoming gradually thinner toward the margin, white or nearly so, soft, brittle. Gills 8-14 mm. wide, about 15 per cm. at the margin of large caps and

25 per cm. at the margin of small caps, gray when young, becoming variegated black, edge white, in mature specimens becoming soft and almost liquid. The gills of mature specimens split into two readily from where they are attached to the cap down to the lower edge. Stem 10-15 cm. long, 5-10 mm. thick at the top, white, solid, brittle, striate or ridged toward the top. In young specimens droplets of liquid about 1/2 mm. in diameter are exuded on the upper part of the stem. Scattered or in groups of several dozen specimens on manure heaps, manured ground, and straw.

Genus PSATHYRELLA

The genus closely resembles *Psathyra*, but differs in the spores being definitely black and the margin of the cap of young specimens being straight. Only a single species is described here.

1. *PSATHYRELLA DISSEMINATA*. Cap 5-12 mm. wide, oval when young, later campanulate to convex with an umbo, surface prominently furrowed from the margin to the umbo, first white, then gray or grayish brown, the umbo pale brown. Flesh less than 1 mm. thick, tough. Gills about 15 per cm. at the cap margin, 2 mm. wide, tapered toward both ends, adnate, white when young, gray to black when mature. Stem 2-3 cm. long, slender, white, first delicately hairy, later glabrous, hollow, fragile. Scattered or in groups or clumps on the ground in woods, around stumps, and on compost heaps.

SHAPE AND METHOD OF ATTACHMENT OF PORE FUNGI

(see page 151)

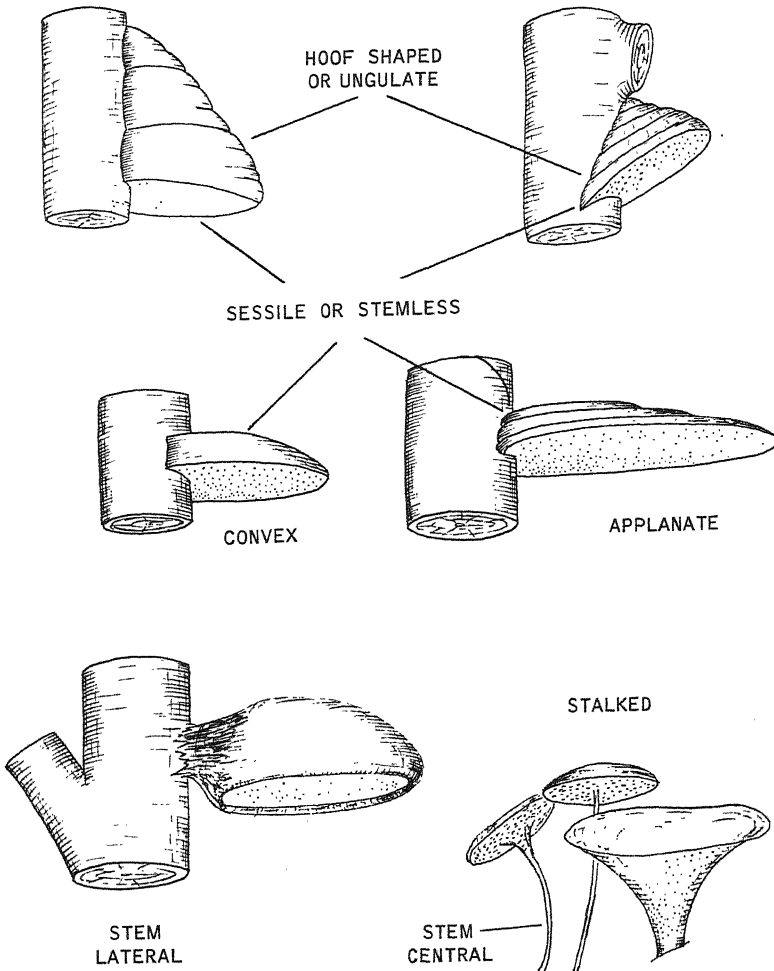
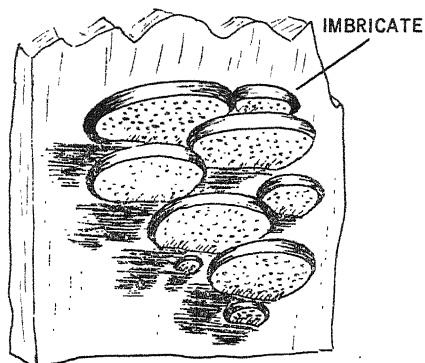
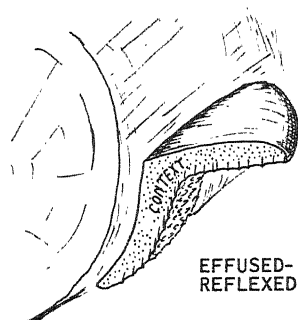
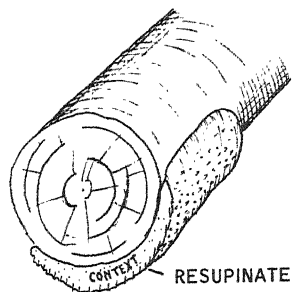
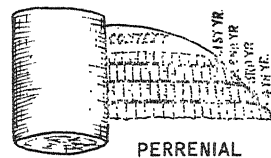
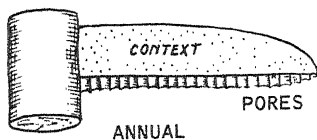


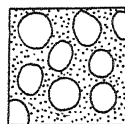
PLATE 8

GROWTH AND STRUCTURE OF PORE FUNGI

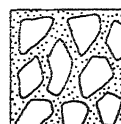
(see page 151)



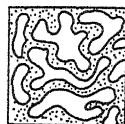
PORE SHAPE



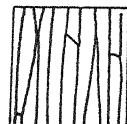
ROUND



ANGULAR



DAEDALOID



GILL-LIKE, OR
LAMELLATE

FAMILY POLYPORACEAE

PORE FUNGI

The family includes those pore fungi in which the fruit bodies are tough, leathery, or woody, and in which the pore layer usually can not be separated easily from the context or flesh, as it can be in the Boletaceae. Those interested in pursuing this group in more detail are referred to "The Polyporaceae of the United States, Alaska and Canada" by L. O. Overholts, published by the University of Michigan Press, Ann Arbor, 1953, which describes 235 species, and to "The Polyporaceae of New York State" by Josiah L. Lowe, a bulletin published by the New York State College of Forestry in 1942, which describes 146 species. The present work contains 57 species.

Key to the Genera of Polyporaceae

1. Fruit bodies perennial; usually very hard and woody - - Fomes
Fruit bodies annual - - 2
2. Fruit bodies soft and fleshy - - 3
Fruit bodies tough, leathery, or hard - - 4
3. Fruit body 8-16 cm. wide, 1.5-3 cm. thick, semi-circular or kidney shaped, with a lateral stem; surface liver colored or brown, flesh soft, white with red streaks; pores 3-7 mm. long, about 10 per cm., each pore separate and distinct from its neighbor. On hardwood stumps - - *Fistulina hepatica* - Page 154.

4. Pores meeting the context in an irregular, uneven line - - *Trametes*
Pores meeting the context in an even line - - 5
5. Pores diamond shaped, fruit body kidney shaped, 3-5 cm. wide, reddish brown to tan or white, with a lateral stem - - *Favolus canadensis*
Page
Pores very daedaloid - - *Daedalia*
Pores round, angular, or irregular - - *Polyporus*

The characters which have been used for more than a century to separate *Favolus*, *Polyporus*, *Daedalia*, and *Trametes* are unsatisfactory because they vary so much from species to species. *Polyporus schweinitzii*, for example, often has pores as daedaloid as those of *Daedalia*, and the character used to separate *Trametes* from the other genera with annual fruit bodies is a rather subtle one. For these reasons, an unknown, annual fruit body should first be compared with *Fistulina hepatica*, page 154 and *Favolus canadensis*, page 154. If it does not fit these, it should be tried in the genus *Trametes*, of which only 2 species are included, then in the genus *Daedalia*, of which only 3 species are included. If it does not agree with any of these, it is almost sure to be a species of *Polyporus*.

Key to the Genus *Daedalia*

1. Pileus hoof shaped, thickness of walls between the pores equal to or greater than the diameter of the pores - - *D. quercina*
Pileus applanate, walls of pores thin - - 2
2. Surface hairy, context about 1 mm. thick, pores breaking up into teeth - - *D. unicolor*
Surface glabrous, concentrically zoned, context 5-10 mm. thick, pores, often elongated radially and sometimes quite gill like
- - *D. confragosa*

Description of Species of *Daedalia*

1. *DAEDALIA CONFRAGOSA*. Pileus sessile, sometimes
with an effused portion,
the shelf 4-15 cm. wide, projecting 3-10 cm.; sur-
face when fresh deep rich brown or with narrow zones
of brown and white, delicately pubescent, later pale
brown, glabrous; margin thin, with the pores extend-
ing to the margin. Context 4-10 mm. thick, at first
almost white, later tan to brown, tough, firm. Pores
5-15 mm. long, 5-20 per cm., usually elongated ra-
dially, especially toward the margin, or poroid near
the point of attachment and gill like elsewhere, at
first white, later brown. Solitary, scattered or
in imbricate groups on decaying wood of deciduous
trees.
2. *DAEDALIA QUERCINA*. Pileus sessile, unguulate,
usually solitary, 3-15 cm.
wide, projecting 3-12 cm., 3-8 cm. thick at the
base, the upper surface straight, the pore surface
slanting upward to the margin, surface gray to
black with inconspicuous concentric ridges. Context
0.5-2 cm. thick at the base, becoming rapidly thin-
ner toward the margin, tan or light brown, in rather
definite horizontal layers, firm and woody. Pores
1-5 cm. long, 5-10 per cm. measured parallel to the
margin, usually radially elongate and daedaloid, the
walls between the pores about 1 mm. thick, rounded
on the lower edge, pale tan. On deciduous wood.
3. *DAEDALIA UNICOLOR*. Pileus effused reflexed or
sessile, rarely entirely
resupinate, imbricate, each shelf 2-8 cm. wide, pro-
jecting 1-5 cm. Surface buff near the base, white
toward the margin, later dark gray toward the base
or becoming green from the growth of algae, woolly,
with 4-8 concentric ridges. The margin thin and
with a poreless band on the under side from 1-3 mm.
wide. Context up to 1 mm. thick, white or pale tan,

tough, pliable but firm. Pores 0.5-1 mm. wide across the narrowest portion, 1-5 mm. long, at first sinuate and very irregular in shape, later the walls breaking up to form teeth (on the vertical, effused portion the pores often are toothlike from the first, at first white, later pale tan or gray.) On deciduous wood, often with a single effused portion extending for several feet along a log.

Genus FAVOLUS

1. FAVOLUS CANADENSIS. (Also known as Favolus alveolaris). Cap circular to reniform, 3-6 cm. across, shallow funnel shape, with a short lateral or central stem or tapering to a stemlike base, surface first reddish brown, later pale tan to nearly white, usually with flat darker scales. Context up to 2 mm. thick, white to pale tan, tough when fresh, brittle when dry. Pores 5-15 per cm., 2-5 mm. long, white, the pore walls becoming rather prominently toothed at the lower end, usually diamond shape, sometimes hexagonal, somewhat longer in a radial than tangential direction. On dead branches and logs of deciduous trees. There is not good reason, other than custom, for not including this fungus in the genus Polyporus.

Genus FISTULINA

1. FISTULINA HEPATICA. Cap 8-16 cm. wide, 1.5-3 cm. thick, slightly convex to flat or with the margin raised slightly, semi-circular or kidney shape, with a lateral stem; surface red, liver colored or brown, usually with darker radial streaks, slightly sticky when young and moist. Flesh 1-2.5 cm. thick, white, streaked with red, soft and watery. Pores 3-7 mm. long, about 10 per cm., each pore with the walls distinct and separate from the walls of the neighboring pores

red or brown. Stem lateral, 2-4 cm. thick, 2-10 cm. long. Solitary or in groups on stumps and logs of hardwoods, rarely on living trees. The fungus is edible, and in America is known as the "beefsteak fungus", in France as "beef tongue." Hard in "The Mushroom" states that "when properly prepared it is equal to any kind of meat"; he obviously was not well acquainted with very good meat. Atkinson, in "Mushrooms", is more conservative and says that it "is highly recommended by some, while others are not pleased with it as an article of food". Regardless of its meaty appearance, like other mushrooms that grow on wood it probably is not very nutritious.

Genus FOMES

This genus is distinguished by the perennial habit of the fruit bodies, some of them living and continuing to produce a new layer of pores each year for more than 50 years, although such longevity is relatively unusual among even the Fomes. The fruit bodies are in nearly all species very firm, hard, and woody.

Key to Species of Fomes

1. Context pink - - *F. roseus*
Context white or pale tan - - 2
Context dark brown - - 5
2. Pileus less than 3 cm. in diameter, usually on alder - - *F. scutellatus*
Pileus larger - - 3
3. Surface white or yellow, coarsely hairy, often covered with green moss - - *F. connatus*
Surface of old growth gray or black, margin white or red - - 4

4. Pores 5-10 mm. long each season, those of one year usually separated by a layer of mycelium from those of the next - - *F. pinicola*
Pores 2-5 mm. long each season, successive pore layers not separated by a layer of mycelium, usually on ash - - *F. fraxinophilous*
5. Successive layers of pores separated by a distinct layer of dark brown mycelium, pore surface white but becoming brown when scratched - - *F. applanatus*
Successive layers of pores not separated by a layer of mycelium - - 6
6. Pores white or straw colored, usually on ash - - *F. fraxinophilous*
Pores grayish brown to dark brown - - 7
7. Growing on coniferous trees or wood, fruit bodies resupinate, effused-reflexed, conch shaped, or hoof shaped, pores irregular in size and shape - - *F. pini*
Growing on deciduous trees or wood - - 8
8. Surface not cracked - - 9
Surface with obvious radial and tangential cracks - - 11
9. Fruit body resupinate, effused reflexed, or plane, surface dark brown to black, radially furrowed and concentrically ridged - - *F. conchatus*
Fruit body ungulate, surface hard, gray or light brown - - 10
10. Surface not ridged, pores dark brown, 50-70 per cm., growing only on *Prunus* - - *F. pomaceus*
Surface with many narrow concentric ridges, pores grayish brown, 30-40 per cm., common on birch and sugar maple - - *F. fomentarius*

11. Old pores, and usually the context, filled with white flecks, fruit body plane to unguulate
- - *F. igniarius*
Flecks inconspicuous or absent, fruit body unguulate, only on oak - - *F. everhartii*

Description of Species of Fomes

1. FOMES APPLANATUS. Pileus sessile, applanate, semicircular to spathulate, on living oak sometimes unguulate, each shelf from 4-40 cm. wide, projecting 4-30 cm., surface gray, brown, or nearly black, usually smooth and with a hard outer layer, with prominent concentric ridges, margin usually rounded and with a narrow band free of pores on the under side. Context dark brown, firm, woolly when broken, often with faint growth zones. Pores 50 per cm., 5-15 mm. long, angular in cross section, the pore layers formed in successive years separated from one another by a layer of brown mycelium 2-3 mm. thick. The pore surface, or mouth, is at first white, and if this surface is scratched, even lightly, the brown mycelium beneath is exposed. Solitary and in groups on hardwood stumps and logs. This fungus sheds spores for some months each year, from the time the pores of the current year begin to grow in the spring until they cease to grow in the fall; the spores are produced in such quantity that on a still, humid day they can be seen issuing from the under side of a fruit body and floating away like a thin cloud of smoke. A. H. R. Buller in his "Researches on Fungi" computed that a large specimen might liberate 30 billion spores a day for a period of 6 months, producing a total of 5,460,000,000,000 spores, a rather astounding total, although, as he pointed out, this involves the discharge of only 1 spore from each pore every six seconds throughout this period. This figure was no mere guess, but was arrived at by counting fairly large samples of spores discharged over a given

period. The spores are brown, and often cover the surface of the fruit body from which they are released.

2. *FOMES CONCHATUS*. Pileus sessile, effused reflexed or rarely resupinate, 4-15 cm. wide, projecting 1-10 cm., the resupinate or effused part often covering an area 1 to 2 meters long; surface brown to black, with many narrow, irregular concentric ridges and a few broad, shallow radial furrows, often partly overgrown with moss; margin rather narrow, on the under side with a narrow band free of pores. Context 1-6 mm. thick, brown, hard and woody. Pores 50-70 per cm., 1-4 mm. long, at first pale tan, later brown, the pore layers of successive years not distinctly separated. On logs of deciduous species, most commonly on ash.
3. *FOMES CONNATUS*. Pileus sessile and shelflike to ungulate, often imbricate in habit, each shelf 4-12 cm. wide, projecting 2-8 cm., surface at first pale yellow and coarsely hairy, later white and nearly glabrous, usually covered with a dense growth of moss and algae; margin either sharp or rounded. Context 5-15 mm. thick, white or pale yellow, rather soft, woolly when broken, soon infested with larvae. Pores 50-60 per cm., 1-5 mm. long, angular, white or pale yellow, old pores often light brown, successive pore layers separated by a thin layer of mycelium the same color as the pores. On living maple, rare on other hardwoods.
4. *FOMES EVERHARTII*. Pileus sessile and shelflike to ungulate, 5-25 cm. wide, projecting 3-15 cm., surface at first smooth and tan to brown, later becoming black and very rough and cracked into irregular portions. Context 0.5-5 cm. thick, brown, hard and woody. Pores 50-60 per cm., 3-8 mm. long, circular or angular, brown, successive layers of pores not separated by a layer of mycelium, older pores partly filled with yellow or brown

mycelium. On living hardwoods, especially oaks. It resembles *Fomes igniarius*, but the surface is rougher; also it has brown spores, while those of *Fomes igniarius* are white.

5. *FOMES FOMENTARIUS*. Pileus sessile, unguulate, 3-12 cm. wide, projecting 2-10 cm., 3-12 cm. in a vertical direction, surface gray to tan, with numerous faint concentric bands of color and several wide or narrow low concentric ridges, hard, glabrous, smooth and often shiny; margin rounded and free of pores below. Context 1-3 cm. thick at the base, becoming rapidly thinner toward the margin, dark brown, firm but rather woolly when broken, with faint growth zones. Pores 30-35 per cm., 0.5-2 cm. long each season, those of successive years continuous with each other and not filled with mycelium, so that it is not possible to determine where the pores of one year end and those of the next year begin. On dead hardwood trees and logs, especially common on birch.

6. *FOMES FRAXINOPHILOUS*. Pileus applanate to unguulate, 5-20 cm. wide, projecting 4-15 cm., 3-10 cm. thick, surface of present year's growth (the margin) white, older portion dark gray or black and usually cracked into irregular squares, margin rounded. Context 0.5-1.5 cm. thick, pale tan to brown, hard and woody. Pores 2-4 mm. long each year, 20-30 per cm., the walls rather thin, pale tan, the old pores colored like the context but filled with pale tan mycelium, the successive layers of pores indistinctly separated visually, but capable of being peeled apart. On living or dead hardwoods, especially ash.

7. *FOMES IGNIARIUS*. Pileus sessile and unguulate, rarely resupinate, on birch often applanate, each shelf 4-20 cm. wide, projecting 1-15 cm. surface dark gray to black, divided by fine cracks into irregular squares, with many con-

centric ridges, rarely brown and not at all or only slightly cracked. Context dark brown, woody, brittle, flecked with white. Pores 40-70 per cm., 2-5 mm. long, at first grayish tan, later brown, pore layers of successive years not distinctly separated but the old pores filled with mycelium and flecked with white, walls of pores often twice as thick as the pore openings. Common on living and dead trees of deciduous species. There are numerous forms of this species, some of which seem very distinct.

8. FOMES PINI. Pileus sessile, effused reflexed or shelflike, rarely resupinate, the individual shelves 3-12 cm. wide, projecting 1-8 cm., surface first reddish brown and pubescent, later almost black and glabrous, with many narrow, definite, concentric ridges, and irregular radial ridges or folds. Context 1-10 mm. thick at the base, first yellow brown, later reddish brown, hard, woody. Pores 6-40 per cm., 1-5 mm. long, often very irregular in shape and size, first yellowish brown, later dark reddish brown, often the successive layers of pores indistinctly separated. Common on living trees, less common on logs, of coniferous species. This species probably causes more decay in living conifer trees throughout the northern hemisphere than any other single fungus.

9. FOMES PINICOLA. Pileus sessile, applanate or considerably thicker at the base than at the margin, sometimes almost spherical when young, 6-40 cm. wide, projecting 5-30 cm., surface variable in color, the current year's growth pale tan at first, soon becoming deep red, the older part black; sometimes the current season's growth is white to pale tan, last year's growth bright red, and the older portion black; with rather wide rounded concentric ridges. Context 0.5-3 cm. thick, pale tan, tough but rather woolly when broken. Pores 40-50 per cm., 5-10 mm. long, round, regular in size and shape, at first white to pale yellow, later pale

tan or brown, layers of successive years separated by a layer of mycelium 1-3 cm. thick and of the same color as the pores. On dead trees and logs of coniferous and deciduous species; it is more common on conifers than on hardwoods, but has been found on more than 100 species of trees.

10. *FOMES POMACEUS*. Fruit body sessile and unguulate or pendulous, 2-6 cm. wide, projecting 1-3 cm., surface of present year's growth brown and pubescent, the older portion gray to black and glabrous, occasionally slightly cracked. Context 5-10 mm. thick, dark brown, hard, sometimes with faint growth zones. Pores 50-70 per cm., 2-5 mm. long, brown like the context, the layers formed in successive years not distinctly separated from each other. On dead trees of pome-fruit trees.

11. *FOMES ROSEUS*. Pileus sessile, unguulate to applanate, 3-10 cm. wide, projecting 2-8 cm., surface with narrow concentric ridges, the older part cracked, pale pink near the margin, otherwise black. Context 5-10 mm. thick, pale pink, with faint growth zones, firm, woolly when broken. Pores 30-50 per cm., 1-3 mm. long, at first pale pink, later tan to brown, layers of successive seasons not separated by a layer of mycelium, the older pores filled with mycelium. On conifer logs.

12. *FOMES SCUTELLATUS*. Pileus sessile or attached by a narrow base and then pendulous, 0.5-2.5 cm. wide, projecting 0.3-2 cm., surface at first almost white, becoming tan, then brown to black, usually remaining paler at the margin, with narrow concentric ridges. Context 1-2 cm. thick, tan to brown, firm. Pores 1-3 mm. long, 35-45 per cm. toward the center and 50-60 per cm. at the margin, tan to brown, the successive annual pore layers not distinctly separated, old pores filled with mycelium. Common on dead alder and

witch hazel. Because of its small size this *Fomes* can easily be confused with a *Polyporus*, especially when only 1 year old.

Key to the Genus *Polyporus*

1. Fruit body with a central or lateral stem - - 2
Fruit body without a stem - - 16
2. Context very pale tan or white - - 3
Context brown - - 12
3. Base of stem or entire stem black - - 4
Stem not black - - 7
4. Surface of cap white, scaly - - 5
Surface yellow to brown or black, not scaly
- - 6
5. Scales large, pores 3-10 per cm., stem lateral
or sublateral, growing on wood
- - *P. squamosus*
Scales minute, pores 20-30 per cm. stem central,
growing on ground - - *P. melanopus*
6. Pileus 1.5-6.0 cm. wide, stem 1-6 cm. long,
2-6 mm. thick, pores 40-50 per cm.
- - *P. elegans*
Pileus 5-25 cm. wide, stem 1-6 cm. long, 0.5-2.0
cm. thick, pores 60-80 per cm. - - *P. picipes*
7. Stem unbranched - - 8
Stem repeatedly branched - - 11
8. Stem lateral, short - - 9
Stem central, length more than several times
the diameter - - 10

-
9. On birch, cap rounded above, context 1 cm. or more thick, margin rounded and projecting beyond the pores - - *P. betulinus*
On elm, cap depressed at the point of attachment, context about 1 mm. thick
- - *P. conchifer*
10. Pores elongated radially, somewhat diamond shaped, 10-20 per cm. - - *P. arcularius*
Pores usually not elongated radially, 20-30 per cm. - - *P. brumalis*
11. Caps attached centrally - - *P. umbellatus*
Caps attached laterally - - *P. frondosus*
12. Cap with a shiny crust, stem usually lateral, rarely central - - 13
Cap without a shiny crust, stem usually central, rarely lateral - - 14
13. Surface uniformly dark reddish brown, on coniferous wood - - *P. tsugae*
Surface reddish brown near the stem, paler toward the margin, on hardwoods - - *P. lucidus*
14. Cap thin, context less than 3 mm. thick, almost glabrous, with narrow concentric bands of light and dark brown - - *P. perennis*
Cap thin, context less than 3 mm. thick, silky, shiny yellowish brown or reddish brown
- - *P. cinnamomeus*
Cap fleshy, context 5 mm. or more thick, surface hairy - - 15
15. Context in two layers, the upper one soft and spongy, the lower one fibrous and firm
- - *P. circinatus*
Context uniform, pores of fresh specimens often daedaloid - - *P. schweinitzii*

16. Context white or nearly so - - 17
Context brown - - 31
Context orange, red or yellow - - 35
17. Pore surface enclosed by a tough layer of mycelium that covers the entire lower surface of the fruit body - - *P. volvatus*
Pore surface exposed - - 18
18. Entire fruit body sulphur yellow to orange - - *P. sulphureus*
Fruit body not yellow - - 19
19. Pores red, 1 mm. or less long, pore layer elastic when fresh, easily separated from the context - - *P. dichrous*
Pores gray to black - - *P. adustus*
Pores violet tinted - - 20
Pores white, tan or brown - - 21
20. Pores becoming tooth-like, common on the wood of deciduous trees - - *P. pargamensis*
Pores often radially elongated, on coniferous wood - - *P. abietinus*
21. Pileus white - - 22
Pileus gray, yellow, or brown - - 27
22. Context 1-3 mm. thick - - 23
Context 5 mm. or more thick - - 24
23. Pileus sessile, attached by a narrow base, growing only on elm - - *P. conchifer*
Pileus effused-reflexed, pores large, the walls soon becoming toothlike - - *P. tulipiferus*
24. On the wood of deciduous trees - - 25
On coniferous trees and wood - - 26

-
25. Fruit body resupinate, convex, only on oak
- - *P. compactus*
Fruit bodies usually effused-reflexed, imbricate,
on hardwoods - - *P. pubescens*
26. Fruit body attached to the wood throughout the
entire width of the base, each shelf project-
ing 1-3 cm. - - *P. anceps*
Fruit body attached only by a narrow stemlike
base, each shelf projecting 6-12 cm.
- - *P. guttulatus*
27. Context 1 mm. or less thick, fruit bodies 0.5-3.0
cm. wide, upper surface brown or black, some-
times with alternate zones of brown and black
- - *P. planellus*
Context 1 cm. or more thick - - 28
Context 1-8 mm. thick - - 29
28. Pileus applanate, surface brown, velvety
- - *P. resinosus*
Pileus ungulate, surface yellow to gray, coarsely
hairy - - *P. obtusus*
Pileus shelflike, cinnamon brown throughout,
glabrous, soft - - *P. nidulans* (*P. rutilans*)
Pileus applanate to ungulate, pale brown, gla-
brous - - *P. rutilans*
29. Surface with many narrow zones of light and dark
brown, gray, or black - - *P. versicolor*
Surface inconspicuously or not at all zonate
- - 30
30. Surface at first pale yellow, later pale brown
or buff, covered with fine hair, inconspic-
uously zonate with faint bands of tan and
yellow - - *P. zonatus*
Surface gray to brown, covered with long coarse
hair - - *P. hirsutus*

31. Context with a granular core - - *P. dryophilus*
Context uniform in texture - - 32
32. Pores white or tan, surface brown and velvety,
inconspicuously zonate - - *P. resinosus*
Pores brown - - 33
33. On conifer trees, logs, and stumps, pores 10-30
per cm. irregular or daedaloid
- - *P. schweinitzii*
On hardwood logs, pores 40-80 per cm., round
- - 34
34. Surface when fresh with alternate, narrow, shin-
ing golden and brown zones, covered with
short hair, pores toward the margin 40-50
per cm. - - *P. radiatus*
Surface when fresh buff to brown, azonate, gla-
brous or nearly so, pores toward the margin
50-80 per cm. - - *P. gilvus*
35. Entire fruit body sulphur yellow or redd sh
yellow, usually many fruit bodies arising
from a common base - - *P. sulphureus*
Entire body orange or red, solitary or scattered,
never in clumps arising from a common base
- - 36
36. Surface hairy, pores 10-20 per cm.
- - *P. fibrillosus*
Surface glabrous or nearly so, pores 30-40 per
cm. - - *P. cinnabarinus*

Description of Species of Polyporus

1. POLYPORUS ABIETINUS. Pileus sessile, effused
reflexed, or rarely resup-
inate, imbricate, the shelves 1-8 cm. wide, project-
ing 1-3 cm., 2-4 mm. thick, sometimes the base nar-
rowed, surface covered with rather coarse hair, with

many narrow concentric ridges, gray to brown or black at the base, paler toward the margin, sometimes green from algae growing upon it, margin thin, pores extending to the margin. Context 1 mm. or less thick, white, tough, limp. Pores at first round to angular or daedaloid, usually elongated radially, at first deep purple and either remaining so or fading to tan, 20-30 per cm. parallel to the margin, 1-3 mm. long. On conifer logs and wood. It resembles *Polyporus pargamensis* in color, but the radially elongate pores usually serve to distinguish it.

2. *POLYPORUS ADUSTUS*. Pileus effused reflexed or sessile, rarely resupinate, imbricate, the effused portion often covering an area a foot or more in length and several inches wide, each shelf 3-20 cm. wide, projecting 1-4 cm.; surface gray to tan, sometimes with several broad, indistinct zones, finely pubescent to glabrous; margin thin, with a poreless white band 1-2 mm. wide on the under side in fresh specimens, the band in older specimens often turning black. Context 2-3 mm. thick, white to gray, tough; in some specimens there is a narrow dark line between the pores and the white context, but this is not always present. Pores dark gray to black, 0.5-2 mm. long, 60-80 per cm. On dead trees and logs of deciduous species

3. *POLYPORUS ANCEPS*. Pileus white or pale cream, resupinate, effused reflexed, or rarely sessile, the resupinate part up to 10 cm. long; individual shelves 3-6 cm. wide, projecting 1-3 cm., 5-15 mm. thick, the surface rough and irregularly pitted. Context white, tough, not zoned. Pores 4-10 mm. long, 40-50 per cm., slightly angular, white when fresh, often pale yellow when dry or where bruised. Solitary or scattered on conifer posts and logs. It causes a rather important rot of the heartwood of western yellow pine and possibly some related pines, but fruits only on dead and down material.

4. *POLYPORUS ARCULARIUS*. Cap 2-6 cm. wide, 2-4 mm. thick, circular, depressed in the center, glabrous, or sometimes hairy or scaly, brown when fresh and moist, pale tan when dry. Context white or pale tan, up to 2 mm. thick, tough and flexible when moist, brittle when dry. Pores 1-2 mm. long, 10-20 per cm., radially elongated and usually diamond shape, edges thin and slightly toothed, white to pale brown. Stem central, 2-7 cm. long, 2-5 mm. thick, tan to dark brown, usually slightly hairy or scaly, especially toward the base. Solitary or in groups on stumps, logs and wood of deciduous trees.
5. *POLYPORUS BETULINUS*. Pileus usually convex, rarely pendulous, circular to reniform, often with a short lateral stem, 5-25 cm. wide, projecting 5-15 cm., surface white to brown, at first smooth, later cracked; margin thick and rounded, forming a band up to 1 cm. wide around the pore surface. Context 1-3 cm. thick, white, firm. Pores 30-40 per cm., 5-15 mm. long, at first white, later yellow or tan, walls between the pores at first thick but later becoming thin and toothed. In fresh specimens the entire pore layer can be peeled from the fruit body. The pore layer does not begin to form until the fruit body has attained its maximum size, and so rather large fruit bodies can be found with very short pores or none at all. On dead trees, logs and branches of birch.
6. *POLYPORUS BRUMALIS*. Cap 2-6 cm. wide, 2-5 mm. thick, circular, depressed in the center, dark brown when moist, tan when dry, velvety when young but later glabrous, sometimes with indistinct concentric zones. Context 1-3 mm. thick, nearly white, tough and elastic when fresh, brittle when dry. Pores 1-3 mm. long, 20-30 per cm., angular, sometimes longer radially, almost white when fresh, later pale brown. Solitary or scattered on logs and stumps of deciduous trees.

7. *POLYPORUS CINNABARINUS*. Pileus sessile, rarely
effused reflexed, each
shelf 3-14 cm. wide, projecting 2-6 cm., 7-20 mm.
thick at the base, surface bright orange red when
fresh, fading to tan when old, at first pubescent,
later glabrous. Context orange red when fresh, fading
to tan in old specimens, 5-15 mm. thick, spongy,
with definite curved growth zones that sometimes can
be separated from each other. Pores 20-40 per cm.,
often large and irregular near the base and small
toward the margin, 2-5 mm. long, slightly angular,
orange red and remaining so much longer than the
upper surface. Solitary or scattered on stumps and
logs of deciduous trees.
8. *POLYPORUS CINNAMOMEUS*. Pileus 1-4 cm. wide, al-
most flat, with a nar-
row central depression, shiny, reddish or yellowish
brown, with faint concentric zones, often the caps
of two or more adjacent fruit bodies grown together.
Context 1/2 mm. or less thick, pliable, rather tough,
reddish brown, when fresh and moist somewhat elastic.
Pores about 20-30 per cm. at the margin, sometimes
larger toward the stem, angular, dark reddish brown,
walls between the pores thin and toothed. Stem 2-5
cm. long, 2-4 mm. thick, reddish brown, tough and
flexible, velvety. Scattered or in groups on the
ground in woods.
9. *POLYPORUS CIRCINATUS*. Pileus 5-15 cm. wide,
circular or irregularly
circular, flat to shallow funnel shape, one or more
fruit bodies often growing out from the top of an-
other one, sometimes two or more adjacent fruit
bodies grown together; surface buff to dark brown,
hairy, usually with concentric ridges and faint con-
centric zones of color; margin thin, usually de-
curved. Context 5-13 mm. thick at the stem, tan to
brown, made up of two rather distinct layers, the
upper one soft and spongy, the lower one fibrous
and more firm. Pores 30-40 per cm., 2-4 mm. long,

irregular in shape and size, walls thin, very light tan to dark brown, sometimes decurrent but usually ending abruptly near the stem. Stem 2-5 cm. long, 1-2 cm. thick, buff to brown, hairy, made up of two layers like the cap, the outer layer spongy, the inner one fibrous. Solitary, in groups, or in small clumps under conifer trees in which it causes a white pocket rot of the roots and base of the trunk.

10. POLYPORUS COMPACTUS. Pileus resupinate, rarely with a narrow shelf, convex, 3-20 cm. long, 2-10 cm. wide, 8-20 mm. thick, irregular in outline. Context white or nearly so, with definite growth zones, 6-17 mm. thick, firm, tough. Pores often indistinct, 1-3 mm. long, 30-40 per cm., white, pale tan when old or where bruised. Solitary or scattered on stumps and logs of oak. The fungus causes decay in living trees, but fruits only after the trees have been blown or cut down.

11. POLYPORUS CONCHIFER. Pileus circular to reniform, sessile or with a short stemlike base, 1-8 cm. wide, surface white to pale tan, faintly zoned, often with faint radial furrows, frequently with a small cuplike structure in the center or at the place of attachment; margin thin. Context up to 1 mm. thick, white, firm and pliable. Pores 30-40 per cm., 0.5-3 mm. long, the walls thin and toothed, white to pale tan. Common on the upper sides of dead branches of elms and related hardwoods.

12. POLYPORUS DICHROUS. Fruit body resupinate to effused reflexed, rarely shelflike and sessile, the resupinate portion 3-20 cm. long, 2-7 cm. wide, the shelves 2-10 cm. wide, projecting 0.5-4 cm. Upper side white, velvety when fresh, glabrous when old. Context white, 1-3 mm. thick. Pores red to reddish tan, lighter in color toward the margin, 60 per cm., irregular in shape and size, up to 1 mm. long. Pore layer elas-

tic when moist, and easily peeled from the context. On logs and stumps.

13. *POLYPORUS DRYOPHILUS*. Pileus sessile, applanate with a thick base to ungulate, 3-12 cm. wide, projecting 3-8 cm., 3-8 cm. thick at the base, tapering to a sharp or rounded margin; surface tan to reddish brown, usually faintly zonate, first thickly covered with coarse hair, later almost glabrous, at least toward the margin. Context dark brown, the outer part rather soft and woolly, with faint growth zones, the base with a hard, granular core that is flecked with streaks of white. Pores 35-45 per cm., 8-12 mm. long, pore ends first gray, later dark brown. Occasional on living and dead hardwoods.

14. *POLYPORUS ELEGANS*. Pileus 1.5-6 cm. in diameter, round to irregular, flat or depressed in the center, tan to light reddish brown, glabrous. Margin thin, the under side with a narrow band free of pores. Context 2-3 mm. thick, tan, tough when fresh, brittle when dry. Pores 1-2 mm. long, 50-60 per cm., angular, decurrent, walls thin. Stem central or eccentric, rarely lateral, 1-6 cm. long, 2-6 mm. in diameter, glabrous, black from the base almost to the pores, upper part tan. Solitary or scattered on decaying hardwood stumps and logs.

15. *POLYPORUS FIBRILLOSUS*. Pileus sessile or effused reflexed, 3-6 cm. long, projecting 2-4 cm., 0.5-2 cm. thick at the base, surface orange red, coarsely hairy, sometimes with a few faint zones. Context the same color as the surface or paler, 3-15 mm. thick, tough, when squeezed exuding a watery liquid colored like the context. Pores 2-5 mm. long, 10-20 per cm., colored like the context, angular, the walls thin and becoming toothed. Solitary or scattered on decaying logs and stumps.

16. *POLYPORUS FRONDOSUS*. Fruit body compound, the entire structure arising from one large stem and comprising a mass from 30-50 cm. wide, made up of 20 to 100 or more lateral stemmed, branching caps, each cap 3-10 cm. wide, surface brown to tan, pubescent, faintly zoned, radially striate, the margin even or wavy, thin or thick, with pores extending to the edge. Stem lateral, 1-3 cm. thick, 1-4 cm. long, repeatedly and irregularly branched. Pores 10-30 per cm., 1-3 mm. long, white, round or irregular, edges becoming thin and toothed, extending all the way down the stem. On the ground near stumps of deciduous trees.
17. *POLYPORUS GILVUS*. Pileus sessile and shelflike or effused reflexed, 3-10 cm. long, projecting 2-6 cm., 1-2.5 cm. thick at the base; surface yellowish brown to reddish brown, slightly pubescent when young, glabrous when mature, margin sharply acute, the under side with a narrow band free of pores. Context 5-15 mm. thick, golden brown, with faint growth zones, tough when fresh, firm when dry. Pores brown, 3-7 mm. long, 50-80 per cm., slightly angular, walls about as thick as the diameter of the pores. Scattered on wood of deciduous trees, especially on the sapwood of oak.
18. *POLYPORUS GUTTULATUS*. Fruit bodies sessile, 6-15 cm. wide, projecting 6-12 cm., 1.5-4 cm. thick at the base, with a narrow, lateral, stemlike attachment, rarely almost circular and with a central stemlike attachment, often sloping downward from the margin to the base. Surface white when young, reddish brown when old, with several broad, inconspicuous ridges. Context 1-4 cm. thick at the stemlike base, 2-3 mm. thick at the margin, white, fibrous. Pores 4-9 mm. long where longest, tapering to nothing at the margin, 40-50 per cm., circular or irregular, pale yellow inside, becoming reddish when bruised. Sometimes the pores are in 2 or 3 rather distinct layers.

When young, and growing in humid weather, the fruit bodies exude drops of clear liquid all over the upper surface, and fresh fruit bodies have a faint but definite and rather sweet odor. Solitary, scattered or in clumps on stumps, logs and the bases of dead conifer trees, especially spruce and firs.

19. POLYPORUS HIRSUTUS. Pileus sessile or effused
reflexed, the reflexed
portion of each shelf remaining distinct from those
adjacent to it and not fused to form one large re-
flexed portion as in so many Polypores, sometimes
imbricate, when growing from the top of a log the
pileus may be circular, shallow funnel shape and
have a stemlike base; the shelf 1-8 cm. wide, pro-
jecting 1-5 cm., surface faintly zoned, densely
hairy, the hairs long and coarse, gray to light
brown, margin usually thin and with a narrow pore
free band on the under side. Context 1-4 mm. thick,
white, tough and pliable when fresh, but stiff and
brittle when dry. Pores 25-40 per cm., 1-3 mm. long,
usually round, rarely irregular or daedaloid, scat-
tered pores 0.5-1 mm. in diameter, first white, soon
yellowish or tan. On stumps and logs of hardwoods,
rare on conifers.

20. POLYPORUS LUCIDUS. Pileus almost circular or
irregularly semicircular,
3-25 cm. in diameter, 1-3 cm. thick, surface shiny
reddish brown near the stem, pale brown toward the
margin, often concentrically ridged, margin pale
tan, thick and rounded. Context light brown, firm,
fibrous, 5-15 mm. thick. Pores 30-50 per cm., 5-15
mm. long, tan to brown. Stem 2-5 cm. long, 1.5-3
cm. thick, central, eccentric, or lateral, shiny
reddish brown. On stumps and logs, and on the ground
near decaying stumps.

21. POLYPORUS MELANOPUS. Pileus 3-15 cm. wide, circular, shallow funnel shape, surface tan to dark brown, minutely scaly. Context white to pale tan, 3-15 mm. thick, spongy when fresh, brittle when dry. Pores 20-30 per cm., 1-5 mm. long, white when fresh, pale brown when dry, walls thin and toothed. Stem central, rarely branched, 5-10 cm. long, 0.5-2 cm. thick, black and velvety toward the base, extending several cm. into the ground.
22. POLYPORUS NIDULANS (also known as Polyporus rutilans). Pileus sessile and shelflike, 3-8 cm. wide, projecting 2-5 cm., 1-2 cm. thick at the base, tapering to a thin margin, surface uniform yellowish brown or cinnamon color. Context and pores same color as the surface, soft and spongy when fresh, brittle and easily crumbled when dry. Pores 3-8 mm. long, 30-40 per cm., circular to angular or irregular. Solitary or scattered on decaying branches of hardwood trees.
23. POLYPORUS OBTUSUS. Pileus sessile, usually unguulate, 4-12 cm. wide, projecting 3-10 cm., 3-8 cm. thick, the surface white or yellow when fresh, densely covered with coarse hair that may disappear with weathering. Context white to tan, 1.5-4 cm. thick, soft and spongy. Pores 1.5-5 cm. long, 5-15 per cm., white when fresh, tan or light brown when old, irregular in shape and diameter, the walls thin and the lower edges becoming toothed. On living deciduous trees, especially oaks.
24. POLYPORUS PARGAMENUS. Pileus sessile and shelflike or effused reflexed, imbricate, the effused portion sometimes covering an area of several square feet and the shelves arising from it irregularly or in rows; each shelf 1-5 cm. wide, projecting 1-4 cm., 2-6 mm. thick, the base often narrowed so that the

shelf is fan shape; surface with different colored zones, usually yellow to brown when fresh, fading to almost white in age, densely pubescent when young, often almost glabrous when old; margin thin, with a narrow band free of pores on the under side. Context white, up to 1 mm. thick, tough and flexible. Pores 1-6 mm. long, 30-40 per cm., at first deep violet, later fading to pale straw color or white, at first round to slightly angular, the lower edges of the walls becoming toothed so that the typical pore structure may disappear altogether except near the margin. Sometimes a new pore layer will form on the fruit body produced the preceding year, but the fungus is not truly perennial.

25. *POLYPORUS PERENNIS*. Pileus 2-6 cm. wide, circular, flat or shallow funnel shape, surface with several to many circular, narrow, sharply delimited zones of color, the narrower zones reddish brown and the broader zones gray, sparsely pubescent, margin thin, slightly wavy. Context up to 1 mm. thick, dark brown, tough and pliable. Pores 20-35 per cm., 1-2 mm. long, gray to brown, short decurrent, walls at first equal in thickness to the diameter of the pores, later thin and the edge toothed. Stem 2-5 cm. long, 2-5 mm. thick, central, brown, velvety, uniform in diameter or tapering upward, solid, firm but flexible. Solitary or scattered on the ground.

26. *POLYPORUS PICIPES*. Pileus with a central or eccentric stem, top 5-25 cm. wide, circular to reniform, surface glabrous, dark reddish brown in the center, tan toward the margin; margin wavy, often decurved, very thin, pores extending to the edge. Context white or pale tan, 4-10 mm. thick at the stem, very thin at the margin, tough and pliable when fresh, brittle when dry. Pores 60-80 per cm., 1-4 mm. long, first white, later tan, circular in young specimens but becoming irregular with maturity, slightly decurrent.

Stem 1-6 cm. long, 0.5-2 cm. thick, enlarged at the base, black at the base or all the way up to the pores, the black portion velvety. Solitary, scattered, or in groups on decaying hardwood logs, rare on conifers.

27. POLYPORUS PLANELLUS. Fruit bodies typically on twigs 0.5 cm. or less in diameter, shelflike, the shelf often extending across the under side of the twig, sometimes resupinate on the under sides of twigs. Each shelf 0.5-3 cm. wide, projecting 1-2 cm., 1-2 mm. thick, sometimes narrowed to a stemlike base. Upper surface when fresh and moist dark brown or nearly black, when dry with alternating zones of brown and black, and radially wrinkled. The margin of fresh, growing specimens nearly white. Context 1 mm. or less thick, tough and pliable. Pores about 40-50 per cm., 1 mm. or less long, nearly white or with a tinge of pale red, round to angular or daedaloid, the lower ends of the walls often toothed and sometimes covered with a delicate fuzz of mycelium. This delicate little Polypore has been said to be rare, but in the writer's experience it is relatively common, growing on fallen twigs of deciduous trees.

28. POLYPORUS PUBESCENS. Pileus 2-10 cm. wide, projecting 2-7 cm., 1-5 cm. thick at the base, sessile and shelflike, imbricate but not densely so, white when fresh, becoming pale yellow when dried. Context 0.5-2 cm. thick at the base, very thin at the margin, white with faint curved growth zones, soft and watery when fresh, brittle and easily crumbled when dry. Pores 2-8 mm. long, 30-40 per cm., an occasional large pore among the smaller ones, round to angular, white when fresh, pale yellow when dry. On deciduous trees. Lowe, in "The Polyporaceae of New York State" considers that this species and Polyporus lacteus are only extreme forms of the same fungus.

29. POLYPORUS RADIATUS. Pileus 2-5 cm. wide, projecting 1-4 cm., 8-15 mm. thick at the base and tapering toward the rounded margin; surface golden yellow to brown when fresh, usually with alternate narrow zones of yellow and brown, covered with short silky hairs, shiny. Context yellowish brown and firm when fresh, soon dark brown and woody, with narrow growth zones. Pores 3-6 mm. long, 40-50 per cm., almost circular or angular, pore surface light grayish brown when fresh and remaining so unless bruised to expose the dark brown mycelium beneath. Usually in imbricate groups on dead branches and small trees of deciduous species.

30. POLYPORUS RESINOSUS. Pileus sessile and shelf-like or effused reflexed, rarely resupinate, each shelf 5-40 cm. wide, projecting 5-30 cm., the reflexed or resupinate portion on the under side of logs sometimes extending a meter or more. Surface at first dark brown to reddish brown, velvety, often concentrically zoned, with definite radial ridges. Margin round and thick. Context 1-4 cm. thick, light tan, soft and watery but tough when fresh, brittle when dry. Pores 40 per cm., 3-8 mm. long, pale tan when fresh, pale brown when dry, round to angular, lower edges often becoming toothed. Commonly in groups and clusters on decaying hardwood logs.

31. POLYPORUS SCHWEINITZII. Pileus circular, shallow funnel shape and with a central stem when growing from roots, sessile and shelflike when growing from stumps or the ends of cut logs, 6-25 cm. wide, surface first yellowish brown, soon dark reddish brown, usually with concentric ridges, at first densely hairy. Context yellow to dark brown, 2-10 mm. thick, spongy when fresh, brittle and fragile when dry. Pores 2-6 mm. long, 10-30 per cm. usually very daedaloid in young specimens and tinged with green, when old dark brown and the walls becoming toothed at the lower ends.

Stem usually central, up to 6 cm. long, 1-4 cm. thick, tough, yellow when fresh, later brown, hairy or glabrous. Near coniferous trees, and on conifer logs and stumps.

32. POLYPORUS SQUAMOSUS. Cap 8-30 cm. wide, reniform to nearly circular, shallow funnel shape, surface pale tan to brown, with many large, flat, pointed scales, margin thin and usually turned down. Context white, 1-3 cm. thick near the stem, soft or tough when fresh, brittle when dry. Pores 4-10 per cm., 2-6 mm. long, white or pale tan, irregular in size and shape, walls thin, the bottom edge toothed when old, decurrent and ending in a network on the stem. Stem lateral to nearly central, 1-6 cm. long, 1-4 cm. thick, black at the base, pale tan or white toward the top. On stumps, logs, and living hardwood trees. If a fresh, mature fruit body is placed in a covered glass container it will shed spores copiously for a week or more, and the falling spores can be seen readily by shining a light through the glass. A. H. Reginald Buller, famous mycologist at the University of Manitoba, estimated that a single fruit body of this fungus produced about 50 billion spores, illustrating the prolificacy of these fungi. The fungus is said to be edible, but one man who tested it was moved to write to me, stating, "So tough when fried it couldn't be cut with a steak knife!"

33. POLYPORUS SULPHUREUS. Pileus sessile and shelf-like or effused reflexed, narrowed at the base, each shelf 5-30 cm. wide, projecting 3-25 cm., on standing trees the effused portion extending as much as a meter up and down the trunk, on the upper side of logs often forming a rosette of many shelves, many of them narrow and tongue shape; surface yellow to bright golden orange when fresh, with few to many zones of slightly contrasting color, fading to pale tan in age, finely pubescent or glabrous, radially ridged and furrowed,

the margin usually thick and rounded, often wavy. Context 0.5-2 cm. thick, white or pale yellow, firm but easily broken when fresh, brittle when dry. Pores 30-40 per cm., 1-5 mm. long, angular, golden yellow when fresh, pale tan when dry, the walls at first thick, later thin. Common on stumps, logs and living trees of hardwoods, rare on conifers. This is one of the few Polypores succulent enough to be edible - cut in thin slices and fried it often is delicious.

34. POLYPORUS TSUGAE. Pileus reniform, semicircular or rarely circular, 10-30 cm. wide, projecting 8-20 cm., 1-3 cm. thick; surface uniform reddish brown and shiny as if varnished, centrically zoned. Context tan to almost white, spongy, 2-10 mm. thick. Pores 55-65 per cm., 8-15 mm. long, circular to angular, tan, pore layer ending very abruptly on the stem. Stem usually lateral, occasionally central, 3-10 cm. long, 2-8 cm. wide, rarely branched, colored like the cap. On logs and dead trees of hemlock, rarely on wood of other coniferous species.

35. POLYPORUS TULIPIFERUS. Pileus usually effused reflexed, sometimes resupinate, imbricate, shelves numerous, up to 3 cm. wide and projecting as much as 1 cm.; surface white, pubescent when fresh, faintly zoned, margin thin. Context 0.5-3 mm. thick at the base, white, tough and pliable. Pores 1-8 mm. long, 10-20 per cm., the walls soon forming long, irregular, pointed teeth; usually shallow pores can be distinguished at the margin. Common on dead trees and branches of hardwood species.

36. POLYPORUS UMBELLATUS. Fruit body compound, made up of many centrally stemmed caps, each cap 1-4 cm. wide, convex but with a narrow depression in the center, surface almost white to pale brown, glabrous or fibrous, the

margin thin. Context white, 1 mm. thick, tough when fresh, brittle when dry. Pores 20-40 per cm., 1-2 mm. long, white when fresh, later pale brown. Stems central, repeatedly branched. At the base of deciduous trees and stumps.

37. POLYPORUS VERSICOLOR. Pileus 2-6 cm. wide, projecting 1-4 cm., 2-3 mm. thick, often narrowed toward the base, sessile and shelflike or effused reflexed, usually densely imbricate; surface with many narrow concentric bands of gray, brown, white and black, some of the narrower bands usually glabrous and shiny but the wider ones covered with thick short hair. Context 1 mm. or less thick, white, flexible when fresh, tough when dry. Pores 40-60 per cm., 1-2 mm. long, very white when fresh and remaining nearly so when dry, round or slightly angular. Common on stumps and logs of deciduous trees.

38. POLYPORUS VOLVATUS. Pileus 1-3 cm. wide, projecting 1-3 cm., 1-3 cm. thick at the base, ungulate or globose, usually sessile but sometimes with a stemlike base; surface glabrous, shiny, tan to brown when fresh, paler when old; the pore surface covered by a tough layer of mycelium. Context white or pale tan, spongy when fresh, firm and hard when dry, 5-15 mm. thick at the base, thinner toward the margin. Pores 4-10 mm. long, 40-50 per cm., tan to brown, walls at first very thick and rounded, later thin. On logs and standing dead conifer trees.

39. POLYPORUS ZONATUS. Pileus 3-8 cm. wide, projecting 2-5 cm., 3-6 mm. thick at the base, sessile and shelflike; surface at first pale tan, later becoming dark tan or with alternate zones of yellowish tan and brown, densely covered with short hair. Context white, firm, 2-3 mm. thick. Pores white when young, later yellowish, 30-40 per cm., 1-3 mm. long, angular, the bottom

edges becoming somewhat toothed when old. Scattered or in dense clumps, often imbricate, on logs and stumps of hardwoods.

Key to the Genus *Trametes*

1. Fruit bodies imbricate in clusters of 3 to 20 fruit bodies, each shelf 3 to 8 cm. wide, 5 to 10 mm. thick at the base, surface covered with long, coarse yellowish or brown hair, pores 5-10 mm. long, 8-15 per cm., angular or daedaloid - - *T. hispida*

Fruit bodies imbricate or scattered, each shelf 2 to 8 cm. wide, 5 to 10 mm. thick at the base, pores 2-4 mm. long, 30-50 per cm., entire fruit body pale rose colored inside and out when fresh, the top later fading to pinkish tan - - *T. carnea*

Description of Species of *Trametes*

1. *TRAMETES HISPIDA*. Pileus sessile or effused reflexed, each shelf 3-8 cm. wide, projecting 2-5 cm., 1-2 cm. thick at the base, tapering to the margin, surface gray, yellowish, or brown, covered with long coarse hair when young but weathering to almost smooth, context pale brown, firm, 5-10 mm. thick. Pores 5-10 mm. long, 8-15 per cm., angular, sometimes daedaloid, usually varying greatly in shape and size in each fruit body, grayish brown. Usually in imbricate clusters containing 3 to 20 fruit bodies, sometimes solitary, on living and dead hardwoods.

2. *TRAMETES SUBROSEA*. Pileus sessile or effused reflexed, each shelf 2-8 cm. wide, projecting 1-4 cm., 5-10 mm. thick at the base, tapering to a thin margin, surface pale rose colored and delicately hairy when young, grayish brown and

glabrous when old, smooth, without definite zones. Context 2-6 mm. thick near the base, pale rose colored, firm, rather woolly where broken. Pores 2-4 mm. long, 30-50 per cm., pale pink or grayish pink, sometimes a new pore layer is formed on a fruit body of the previous year, but the fungus is not truly perennial. Usually imbricate on conifer logs and stumps.

FAMILY HYDNACEAE

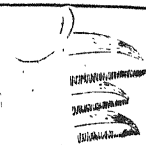
TOOTH FUNGI

All of the species included here are placed in the genus *HYDNUM*, following the usage in many of the reference books to which a beginning student might have ready access. For a more detailed account of the family Hydnaceae, in which the group is divided into 13 genera, see "The Hydnaceae of Iowa" by L. W. Miller and J. S. Boyle, University of Iowa Studies in Natural History, Vol. 18, No. 2, 1943. Also "The Stipitate Hydnums of the Eastern United States" by W. C. Coker and Alma H. Beers, University of North Carolina Press, Chapel Hill, North Carolina, 1951. Below each specific name listed in the key is given in parentheses the name applied by Miller and Boyle.

Key to Species of Hydnaceae

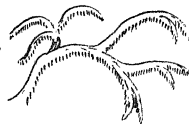
1. Growing on wood - - 2
 Growing on the ground, or from pine cones buried
 in the ground - - 5
2. Fruit bodies shelflike or with a short lateral
 stem - - 3
 Fruit bodies of many divided branches - - 4
3. Fruit bodies white, usually in a clump of sev-
 eral, one above the other, each shelf from
 10 to 30 cm. wide, on living hard maple

- - *H. septentrionale*
 (*Steccherinum septentrionale*)



Fruit bodies tan to brown, up to 10 cm. wide,
 on decaying hardwood logs - - *H. adustum*
 (*Steccherinum adustum*)

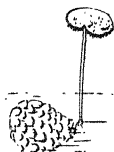
4. Fruit bodies forming a coralloid clump up to
 20 cm. in diameter, teeth small
 and delicate, 3-8 mm. long
 - - *H. coralloides*
 (*Hericium coralloides*)



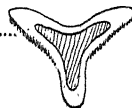
Fruit bodies a dense clump of
 pendant, tapering teeth up
 to 2 cm. long, that conceal
 the branches - *H. caput-ursi*
 (The work cited above con-
 sidered that this species
 grades into *H. coralloides*,
 although no such intergrades
 have been seen by the writer)



5. Growing from buried pine cones (the
 writer has found it only on cones
 of red pine, *Pinus resinosa*
 - - *H. auriscalpium*
 (*Auriscalpium vulgare*)
 Growing in soil - - - 6



6. Flesh of cap in 2 distinct layers, the
 upper one soft, the lower one, which
 continues down into the stem, firm
 and almost woody - - 7
 Flesh of cap not obviously
 in two layers - - 9



7. Spore print brown - - *H. velutinum*
 (*Calodon velutinus*)
 Spore print white - - 8
8. Hard interior portion of cap dark blue-black
 - - *H. albonigrum*
 (*Calodon alboniger*)
 Hard interior portion of cap light in color
 - - *H. amicum*
 (*Calodon amicus*)
9. Cap, teeth and stem tan to yellow
 - - *H. repandum*
 (*Dentinum repandum*)
 Cap, teeth and stem tan to brown, cap usually
 dark in center, paler toward the margin,
 sometimes zoned, often shallow or deep fun-
 nel shape - - *H. cyathiforme*



(in the publication cited above this is divided
 into 3 species, *Calodon zonatus*, *C. ferrugineus*,
 and *C. scrobiculatus*)

Description of Species of *Hydnum*

1. *HYDNUM ADUSTUM*. Fruit bodies shelflike, 3-8
 cm. wide, projecting 2-4 cm.,
 1-3 cm. thick, often reniform in outline and with
 a short lateral stem, usually several shelves to-
 gether in imbricate fashion; surface tan to cinna-
 mon brown, pubescent, faint concentric zones near
 the margin. Teeth 1-4 mm. long, first white, later
 pink, reddish brown when dry. On hardwood logs and
 stumps.

2. *HYDNUM ALBIGONER*. Cap 4-8 cm. wide, convex to shallow funnel shape, hairy, grayish, the interior of the cap dark blue-black and solid, the color and texture of this interior portion extending down into the stem. Stem 1-2 cm. thick, 3-6 cm. long, gray. Solitary on the ground.
3. *HYDNUM AMICUM*. Cap 6-12 cm. wide, convex to shallow funnel shape, covered with coarse hair, brown toward the center, white toward the margin. Teeth 2-4 cm. long, nearly white when young and fresh, gray or pale brown when dry. Stem 1-2 cm. thick, 2-4 cm. long, pale brown. Solitary or scattered on the ground.
4. *HYDNUM AURISCLAPIUM*. Cap 1-2 cm. in diameter, almost circular to reniform, the stem attached at one side, surface flat or convex, brown to nearly black, faintly zoned, hairy. Teeth 1-2 mm. long, paler than the cap. Stem 3-5 cm. long, 2-3 mm. thick, brown, tough, hairy. The plant grows singly from cones of pine trees that have become buried an inch or so beneath the surface of the ground. It will shrivel and become almost invisible in dry weather, but revive again when moistened, and so may endure for some weeks.
5. *HYDNUM CAPUTURSI*. Fruit body formed of one or more clumps of teeth, the teeth in each clump arising from a common, solid, stemlike base, usually 10-30 teeth in each clump and 10-25 clumps in a fruit body; each tooth 3-10 cm. long, 2-4 mm. thick at the upper portion, narrowed downward to a fine point, entirely white when fresh, tan when old. On hardwood logs.
6. *HYDNUM CORALLOIDES*. Fruit body originating from a single stem that branches repeatedly to form an irregularly spherical or hemispherical cluster 4-30 cm. wide, the teeth

3-6 mm. long, tapering to a point, borne on the under sides of the branches, white when fresh, tan when old. On decayed hardwood logs.

7. *HYDNUM CYATHIFORME*. Cap 4-8 cm. wide, tan to brown, darker in the center, often zoned toward the margin; teeth 1-3 mm. long, brown; stem 1-2 cm. thick, 2-3 cm. long, brown like the cap. Solitary, scattered or in groups on the ground.

8. *HYDNUM REPANDUM*. Cap 3-8 cm. wide, convex or nearly plane, surface yellow, tan or reddish tan, smooth. Flesh white, 5-10 mm. thick near the stem, spongy. Teeth 4-8 mm. long, pointed, pale yellow, decurrent. Stem 3-6 cm. long, 1-2 cm. thick, at first solid, later hollow, usually central but sometimes eccentric. On the ground in woods.

9. *HYDNUM SEPTENTRIONALE*. Fruit body shelflike and sessile, a number of shelves growing out in imbricate fashion from a common base, each shelf 8-30 cm. wide, projecting 5-15 cm., 2-3 cm. thick, surface white, slightly hairy or glabrous, margin rounded. Flesh 1-2 cm. thick, white, firm and tough. Teeth 1-2 cm. long, fine, not tapering to a point. In clumps on living hardwood trees.

10. *HYDNUM VELUTINUM*. Cap convex, flat or shallow funnel shape, pale tan to brown, surface pubescent. The context is divided into 2 portions, the upper soft and spongy, the lower firm and solid, and this solid layer extends down into the stem. The plants are irregular in shape and size, up to 10 cm. in diameter, often with several caps grown together. Stem 1-2 cm. thick, 2-8 cm. long, bulbous at the base, the outside soft and spongy, the interior hard.

FAMILY BOLETACEAE

According to "A Dictionary of the Fungi", by G. C. Ainsworth and G. R. Bisby, published by the Imperial Mycological Institute, Kew, Surrey, England, the family Boletaceae includes 220 species, 200 of them in the genus *Boletus*. The group as it occurs in the eastern U. S. is taken up in detail in "The Boletaceae of North Carolina", by Coker and Beers, whose thorough and excellent account includes keys, descriptions and illustrations of probably most of the species that occur in eastern North America.

Many species of *Boletus* can be distinguished from one another only by microscopic characters, and even with the aid of the microscope it is difficult to identify some of them with any degree of certainty. The present key includes only some of the more common species supposedly identifiable by characters visible to the naked eye, although the writer himself has some doubts as to the certainty of identification of some of those included. This is merely a recognition of the fact, very obvious to anyone who has studied the genus *Boletus*, that many of the species are not readily identifiable.

Key to Species of Boletaceae

1. Caps covered with large woolly tufts,
entire plant dark brown to blue-
black, stem 12-20 cm. long, cap
10-15 cm. in diameter
- - *Strobilomyces strobilaceus*

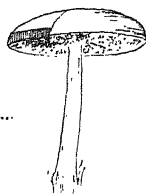


Caps smooth, scaly, or mucilaginous, but not
covered with prominent tufts - - 2

2. Pores shallow, pore layer not easily peeled from flesh of the cap - - *Boletinus*



- Pores deep, pore layer easily peeled from flesh of cap
- - *Boletus*



Key to Species of *Boletinus*

1. Pores very shallow, the pore walls made up of thick, irregular veins, stems often eccentric or lateral, cap red-brown
- - *B. porosus*



- Pores 2-3 mm. long, cap covered with red scales between which the yellow flesh of the cap is exposed, with a definite veil when young - - *B. pictus*



Description of Species of *Boletinus*

1. *BOLETINUS PICTUS*. Edible. Cap convex to almost flat, 4-12 cm. wide, dark red, often yellowish toward the margin, surface usually with scattered yellow scales. Flesh yellow, becoming reddish when broken, 0.5-1 cm. thick. Pores yellow, 3-5 mm. long, 5-20 per cm., angular or irregular. Stem 1-2 cm. thick, 4-7 cm. long, colored like the cap. Young specimens have a rather thick white veil which remains as a ring on the stem when the cap expands. Scattered on the ground from swamps to uplands in woods.

2. BOLETINUS POROSUS. (also known as Boletinus merulioides). Edible.

Caps 5-12 cm. wide, convex to flat or shallow funnel shape, irregular in outline, sometimes reniform or strongly indented where the stem is attached, olive brown to reddish brown. Flesh 0.5-1 cm. thick near the stem, pale yellow or greenish yellow. Pores very irregular in shape and size and only 1-3 mm. deep, the walls between the pores frequently being no more than veins, continuing down the stem a short distance, lighter in color than the cap. Stem lateral or very eccentric, 1-2 cm. thick at the top, tapering toward the base, 2-4 cm. long, colored like the cap surface. In groups or dense clumps around decaying hardwood stumps.

Key to Species of Boletus

1. Definite veil between margin of cap and upper stem on young plants, which remains as a ring on the stem of mature plants - - 2



Plants without veil or ring - - 3

2. Caps pores and stems chrome yellow - - *B. luteus*
 Caps red-brown, veil usually tough and persistent - - *B. sphaerosporus*
3. Flesh of cap not changing color when broken or bruised - - 4
 Flesh of cap changing color when broken or bruised - - 5
4. Cap surface red-brown, sticky when fresh, flesh of cap white or pale yellow, stem without markings - - *B. granulatus*
 Cap surface yellow to brown, sticky when fresh, flesh of cap yellow, stem covered with a network of markings - - *B. retipes* and *B. edulis*

5. Surface of cap of fresh specimens covered with a thick layer of slime, flesh of cap pale yellow, turning faint pink or violet when broken - - *B. subaureus*

Surface of cap of fresh specimens not covered with a layer of slime - - 6

6. Cap surface smooth, sometimes somewhat sticy, flesh of cap turns red when broken
- - *B. scaber*

Cap surface tan, brown, reddish or mottled tan and reddish, flesh of cap turns pale pink when broken - - *B. felleus*

Description of Species of Boletus

1. *BOLETUS EDULIS*. Edible. Cap 10-20 cm. wide, convex, reddish tan to brown, smooth, slightly sticky when fresh and moist. Flesh white and remaining so when broken, 1-2 cm. thick. Pores white, 20-30 per cm., 1.5-2 cm. long, the pore surface curving upward near the stem. Stem 6-12 cm. long, 1-2 cm. in diameter, colored like the cap or nearly white.

2. *BOLETUS FELLEUS*. Edible. Cap 12-20 cm. wide, convex, smooth, light to dark brown. Flesh 2-3 cm. thick, first white, pale pink where broken. Pores white when young, flesh color or almost rosy when old or where bruised, 1-2 cm. long, 10-20 per cm.. Stem 6-15 cm. long, 1-2 cm. thick at the top, often bulbous at the base, colored like the cap or paler, sometimes with a network of ridges near the top or most of the way down.

3. *BOLETUS GRANULATUS*. Edible. Cap 6-12 cm. wide, convex, smooth, sticky when young and moist, covered with a thin transparent cuticle than can be peeled off easily, reddish tan to reddish brown. Flesh 1-1.5 cm. thick near

the stem, white or pale yellow. Pores first pale yellow, later reddish brown, 15-20 per cm., 3-5 mm. long. Stem 4-6 cm. long, 1-1.5 cm. thick, white to pale yellow but covered with specks or dots that first are red and later reddish brown.

4. *BOLETUS LUTEUS*. Edible. Cap 6-12 cm. wide, convex, yellow to yellowish brown, smooth, the cuticle rather thick and easily peeled off. Flesh white to pale yellow, 1-1.5 cm. thick at the stem. Pores pale yellow to yellowish brown, 5-10 mm. long, 15-20 per cm.. Stem 4-8 cm. long, about 1 cm. thick, colored like the cap. Young specimens have a rather thick, tough, sticky veil that remains as a prominent annulus near the top of the stem.

5. *BOLETUS RETIPES*. Edible. Cap 8-16 cm. wide, convex, smooth, yellow to brown. Flesh pale yellow, becoming deep yellow when broken. Pores pale to deep yellow, 10-20 per cm., 8-10 mm. long, the pore surface curved upward near the stem. Stem 7-10 cm. long, 1.5-2 cm. thick, yellow, covered with a network of ridges.

6. *BOLETUS SPHAEROSPORUS*. Edible. Cap 6-12 cm. wide, convex, light brown when young, dark reddish brown when mature, smooth. Flesh pale yellow to pale brown, 1-1.5 cm. thick near the stem. Pores pale yellow, 2-6 mm. long, the lower edges becoming toothed when old, irregular or angular in outline. Stem 6-6 cm. long, 2-3 cm. thick. Young specimens have a thick white or tan veil that when the cap expands remains as a persistent and prominent annulus near the base of the stem.

7. *BOLETUS SUBAUREUS*. Edible. Cap 6-10 cm. wide, convex to flat, sticky when young and moist, pale yellow or with spots of reddish brown. Flesh pale yellow, becoming faint red-

dish brown when broken, 1-1.5 cm. thick at the stem. Pores 8-12 mm. long, 10-20 per cm., yellow or yellowish brown. Stem 5-8 cm. long, 1-1.5 cm. thick at the top, yellow or dotted with reddish brown specks.

Genus STROBILOMYCES

So far as is known this genus contains only a single species. *Strobilomyces strobilaceus*. Edible. Cap 6-12 cm. wide, spherical when young and covered with a thick layer of woolly, dark brown mycelium that breaks up into soft tufts or pyramidal scales as the cap expands, exposing the pale brown under layer; hemispherical or convex when mature. Flesh 1-2 cm. thick near the stem, disappearing near the margin, soft and dark, pale tan when first broken, becoming reddish brown within a few minutes; often exuding a reddish brown juice, slowly becoming dark blue or blue black. Pores 1.5-2.5 cm. long, 10 per cm. near the stem, 20 per cm. near the margin, dark brown, soft, each pore not separable as a unit. Stem 8-12 cm. long, 1-2 cm. thick at the top, enlarged at the base, dark brown outside, with a tough and fibrous outer layer, the interior firm but not tough, differing in texture from the flesh of the cap and easily removed from the cap; colored like the flesh of the cap and exuding a red juice when cut, usually with a peculiar square cavity in the interior near the top. Young specimens have a veil which as the cap expands forms a ring on the stem, but this disappears quickly. The spore print is dark brown. Scattered on the ground in deciduous woods.

FAMILY CLAVARIACEAE

CLUB FUNGI

This family of fungi, commonly called the Club Fungi, includes about 200 species. The family is taken up in detail in "The Clavarias of the United States and Canada", by W. C. Coker, published by the University of North Carolina Press in 1923. Many of the species are identifiable only by microscopic characters and none of them are by no means easily identified even with this aid. Only those are included here which the writer has found commonly and which he feels can be identified with at least reasonable certainty in the field. As with the Family BOLETACEAE, the writer is of the opinion that this group of fungi is not yet well enough known throughout the country to enable us to identify even some of the more common kinds with a high degree of certainty with or without recourse to the microscope. All of the species included in the present key are in the genus *Clavaria*.

Key to Species of *Clavaria*

1. Plants repeatedly branched

- - 2



Plants not branched - - 5



2. Growing on decayed wood - - *C. stricta*
Growing on the ground - - 3
3. Fruit body pale violet - - *C. amethystina*
Fruit body ash gray - - *C. cinerea*
Fruit body yellow - - 4
4. Flesh of stems and branches turning red when
bruised - - *C. flava*
Flesh not turning red when bruised - - *C. aurea*
5. Fruit bodies 6-15 cm. high, tan in color, often
thick at the top and tapering downward
- - *C. pistillaris*
Fruit bodies 0.5 to 1.0 cm. high, on decaying
hardwood logs covered with the green alga
Chlorococcus - - *C. mucida*

Description of Species of *Clavaria*

1. *CLAVARIA AMETHYSTINA*. Edible. Fruit bodies
2-8 cm. tall, composed
of numerous rather fine main branches that rebranch
near the top, the entire plant violet colored to-
ward the top, paler toward the base.
2. *CLAVARIA AUREA*. Edible. Fruit bodies -12 cm.
high, composed of many main
branches that branch repeatedly, golden yellow to
tan. Usually in scattered clumps on the ground un-
der conifers.
3. *CLAVARIA FLAVA*. Edible. Fruit bodies essential-
ly identical with those of
Clavaria aurea, but the flesh when broken becomes
reddish brown.
4. *CLAVARIA MUCIDA*. Fruit bodies consisting of a
single unbranched (or rarely
branched once) upright stalk that tapers to a point

at the top, about 1 cm. high, 1-2 mm. in diameter, golden yellow to pale yellow, tough. Growing in groups of dozens to hundreds of plants on decaying hardwood logs covered with the alga *Chlorococcus*.

5. *CLAVARIA PISTILLARIS*. Edible. Fruit bodies consisting of an unbranched or rarely branched upright stalk up to 10 cm. tall, 1-2 cm. in diameter at the top, tapering downward, pale yellow to light brown, often with irregular vertical ridges, flesh white. Scattered or in groups, often of hundreds of specimens, on the ground under pine trees.

6. *CLAVARIA STRICTA*. Edible. Fruit bodies consisting of a mass of main branches arising from a common point, up to 10 cm. high and sometimes 15-20 cm. wide, the branches usually flat or irregular, the topmost branchlets terminating in 2 or 3 delicate teeth, tan to yellowish brown in color. In clumps on decaying logs and at the base of trees.

GASTROMYCETALES

PUFFBALLS AND RELATIVES

The name Gastromycetales means "stomach fungi", and was given to this group because some of the common puffballs suggest the shape of a stomach. The puffballs are among the best of the edible fungi, and some of them are among the easiest fun i to recognize. At one time the spore mass of ripe puffballs was used to stop bleeding, and while it had none of the efficacy of a modern hemostatic it probably was of some good by virtue of its powdery nature which exposed a large surface area and caused quick clotting, and at least the spores of a fresh puffball would be relatively free of filth and bacteria, which is probably more than can be said of many medical materials of a few hundred years ago. There is a common superstition that the spores from puffballs will cause blindness if got into the eyes in quantity, but this has no basis in fact. Those who wish to explore the group more thoroughly are referred to "The Gastromycetes of Iowa" by Paul E. Kambly and Robert E. Lee, published by the University of Iowa, Iowa City, Iowa, as Studies in Natural History, Vol. 17, No. 4.; and to "The Gastromycetes of the Eastern United States and Canada" by W. C. Coker and John N. Couch, published in 1928 by the University of North Carolina Press, Chapel Hill, North Carolina.

Keys to the Families of Gastromycetales

1. Fruit body consisting of a stalk with a slimy, evil smelling mass of spores at the top
 - - Phallaceae (Stink Horns)

Fruit bodies small, usually not more than 1 cm. in diameter and 2 cm. high, shaped like a cup or the flaring mouth of a trumpet, containing several tiny egg like bodies

- - Nidulariaceae (Birds Nest Fungi)

Fruit body spherical or pear shaped, solid and white inside when young, at maturity the interior filled with a brown or purple mass of spores - - 2

2. Fruit body with a stalk extending through the interior from bottom to top - - Secotiaceae

Fruit body without a stalk extending through the interior - - 3 (Puffballs)

3. Fruit body at first subterranean, very hard and firm when young with a thick, leathery outer rind - - Sclerodermataceae

Fruit body firm but soft, with a thin outer wall - - Lycoperdaceae

FAMILY LYCOPERDACEAE

Keys to the Genera of the Family Lycoperdaceae

1. Wall of the upper part of the fruit body breaking up and disappearing at maturity, exposing the spore mass - - Calvatia

Spores escaping through a pore formed at the top of the fruit body at maturity - - 2

2. Outer wall at maturity splitting into star like rays and folding back - - Geaster

Outer wall not splitting into rays - - 3

3. Fruit body tapering toward the base, base composed of spongy mycelium that does not form spores - - Lycoperdon

Fruit body spherical and without a sterile base - - Bovista

Genus BOVISTA

Key to Species of Bovista

1. Fruit bodies 2-4 cm. in diameter - - *B. plumbea*
Fruit bodies 5-10 cm. in diameter - - *B. pila*

Description of Species of Bovista

1. BOVISTA PILA. Edible. Fruit body globose or nearly so, 4-12 cm. in diameter, outer layer at first white and smooth, at maturity scaling off and exposing the inner wall that is smooth, shiny, rather firm, brown with inconspicuous mottled gray patches. It opens at first by a small irregular pore at the top, and this may be enlarged further by cracking or tearing of the wall so that the opening finally is irregular. The spore mass at maturity is deep brown. The fruit bodies are attached to the ground by a small cord of mycelium that usually breaks at maturity and if the fruit bodies are in exposed places they may be rolled about by the wind, shedding their spores as they roll. Solitary or scattered on the ground in pastures and grassy places. The fruit bodies are rather durable, and may be found in good condition nearly a year after they appear.

2. BOVISTA PLUMBEA. Edible. Fruit body spherical or nearly so, 2-3 cm. in diameter, surface first white and mealy, later the outer layer cracks off and exposes the inner wall which is firm, shiny and gray to gray brown. An almost circular, regular pore is formed at the top. The base is attached to a clump of fibrous mycelium and usually does not break away, as does *Bovista pila*. Spore mass at maturity dark brown. Scattered on the ground in grassy places.

Genus CALVATIA

Key to Species of Calvatia

1. Fruit body almost spherical, sterile base inconspicuous or absent, mature spore mass greenish yellow, plants 15 cm. or more in diameter - - *C. maxima*
Fruit body with a thick, tapering base composed of spongy mycelium, distinct from the spore bearing part above - - 2
2. Spore mass at maturity dark purple
- - *C. cyathiformis*
Spore mass at maturity dark brown - - *C. elata*
Spore mass olive yellow - - 3
3. Irregular polygonal warty patches formed on the outer wall toward maturity - - *C. caelata*
Outer wall smooth - - *C. craniformis*

Description of Species of Calvatia

1. *CALVATIA CAELATA*. Edible. Fruit bodies 5-12 cm. wide, 6-14 cm. tall, typically with an almost spherical top and a cylindrical or tapering stalk. Surface white when young, later pale yellow or brown, divided on top into regular patches formed, in some specimens, by the tips of spines being united, and, in other specimens, merely by cracks in the superficial layer. Interior at first white, the spore bearing portion distinct from the sterile base even while both still are white, because the base is spongy with small but obvious chambers, while the portion in which the spores later will be formed is uniform in texture and quite smooth. Spore mass becoming first yellow, then chocolate brown. The odor of recently mature specimens is somewhat aromatic, and is characteristic of the species. The cup shaped base often remains on the ground over winter. Solitary or scattered on

the ground in pastures, grassy places and open woods, sometimes in cultivated fields.

2. *CALVATIA CRANIFORMIS*. Edible. Fruit body rounded or spherical at the top, usually with a definite, tapering, stalk-like base, 5-14 cm. in diameter at the top, surface at first smooth and pale tan or grayish, becoming inconspicuously scaly at maturity, the entire upper part breaking away in flakes at maturity. Spore mass yellowish green at maturity. The stalklike base is composed of spongy mycelium and has a structure suggesting that of a honeycomb. It may remain in place for a long time after the spores have been blown away, in the manner of *Calvatia cyathiformis*, from which it may be distinguished by the greenish yellow spores. On the ground in grassy places and open woods.

3. *CALVATIA CYATHIFORMIS*. Edible. Fruit bodies 6-15 cm. in diameter, varying from nearly spherical to flattened or irregularly puckered, usually with a tapering stemlike base. The surface of the upper portion is typically brown, but varies from tan to brown, and often has a tint of lilac or purple. As the fruit body grows this outermost layer cracks, forming a multitude of small, irregular thin patches separated from each other by the slightly paler under layer. At maturity the spores are dark purple brown. Most of the wall of the upper part of the fruit body breaks away irregularly, leaving the cup shaped base. In groups and often in fairy rings in grassy places and fields.

4. *CALVATIA ELATA*. Fruit body with a spherical or flattened head 3-6 cm. wide upon a tapering stemlike base 4-8 cm. long and 2-4 cm. thick at the top; surface of head white when young, tan to brown when old, the wall of the upper part cracking into fragments and falling away at

maturity, exposing the brown spores. Solitary or scattered on the ground.

5. *CALVATIA MAXIMA*. Edible. Fruit body globose or nearly so, sometimes greater in height than width, 15-60 cm. wide, surface smooth, white when fresh, becoming tan to brown in age, wall breaking up irregularly and falling away at maturity, exposing the brown spores. Interior white and solid when young, changing to yellowish green, then olive brown. Sometimes there is an inconspicuous sterile portion at the base. In grassy places, pastures, and fields. Specimens of this fungus weighing 45 pounds have been found, and the writer has seen one approximately 2 feet in diameter.

Genus *GEASTER*

Key to Species of *Geaster*

1. Rays folding up over the spore sack when dry
- - *G. mammosus*
Rays remaining curved down when dry - - 2
2. Base of mature plant cup shaped and enclosing the lower half of the spore bearing sack
- - *G. fimbriatus* (In *G. triplex* the inner part of the outer wall often remains as a cup about the base of the sack)
Base of mature plant not cup shaped - - 3
3. Base of mature plant hollow, formed by the expansion of a double wall - - 4
Base not hollow - - 5
4. Area around the pore distinct in texture and often in color - - *G. limbatus*
Area around the pore not distinct
- - *G. rufescens*

5. Area around the pore outlined by a groove or ridge, spore sack with a narrow stalk
- - *G. coronatus*

Area around the pore not outlined by a groove or ridge, spore sack not stalked
- - *G. triplex*

Description of Species of Geaster

1. *GEASTER CORONATUS*. Spore sac 6-12 mm. wide, 10-15 mm. high, elongate oval, pointed above, tan to brown, with a short but definite stalk 1-2 mm. long and about 2 mm. in diameter, the mouth area grayish, silky, outlined by a narrow ridge. The outer wall splits to the base into 4-8 (usually 4-5) long, narrow rays that at maturity extend almost straight down, lifting the spore sac above the leaf mold on which is borne. The exposed surface of the recurved rays at first is nearly white, but becomes brown when old. Often leaves or other debris between the tips of the recurved rays are bound together by a delicate weft of mycelium that formed the outer covering of the unexpanded plant. Solitary or in groups of 2 or 3 on the ground in woods.

2. *GEASTER FIMBRIATUS*. Fruit body 2-3 cm. wide when expanded, spore sac 1-1.5 cm. wide, almost spherical, pale brown when fresh, darker when old, the mouth elevated, area surrounding the mouth slightly paler than the rest of the surface but without a distinct border. Outer wall splitting 1/2 the way to the bottom into 5-8 rays, the points of which curl under and remain so, the exposed surface of the recurved rays pale tan. In spite of the specific name, the mouth is no more fringed or fimbriate than in other species. Usually in groups on the ground or leaf mold in forests.

3. *GEASTER LIMBATUS*. Fruit body at first rounded below and somewhat pointed above, 2-3 cm. in diameter, outer surface grayish brown or brown, splitting into 5-8 pointed rays that fold back as in *Geaster triplex*. Spore chamber grayish brown or brown, smooth, shiny, with a definite round pore, the base often stalklike. The base of the plant, below the spore sac or chamber, is hollow and the walls expand to form a bladderlike structure that serves to raise the spore chamber off the ground. Spore mass dark brown. Scattered or in groups on the ground in moist woods.

4. *GEASTER MAMMOSUS*. Spore chamber almost spherical, 1-2 cm. wide, grayish brown when fresh, darker when old, the mouth area silky and paler than the rest of the surface. Outer wall splitting into 7-10 rays of unequal size, the rays recurved when moist, returning to their original position about the spore chamber when dry, grayish brown when fresh, dark brown when old. The hygroscopic character of the rays serves to distinguish this species readily, but moist specimens must be dried somewhat before this becomes evident. Solitary or scattered on the ground in woods and fields.

5. *GEASTER RUFESCENS*. Fruit body at first subterranean, spherical or nearly so, not pointed at the top, appearing above the surface of the soil only after the outer layer has split into sections, outer wall up to 5 mm. thick, splitting only half way to the bottom into 7-10 rays which curve downward. The unsplit portion of the base forms a hollow structure below the spore chamber, as in *Geaster Limbatus*. Spore chamber gray or brown, delicately granular, often with a short stalklike base. Spore mass dark brown. Solitary or scattered on the ground. The very thick outer wall should serve to distinguish it from closely related species.

6. *GEASTER TRIPLEX*. Spore chamber almost spherical, 2-4 cm. in diameter, pale grayish brown when fresh, brown to reddish brown when old, the pore or opening in the top surrounded by a light colored, silky shining area 5-12 mm. in diameter, the margin of the pore projecting upward and fringed. Outer wall splitting almost to the base into 6-8 rays that in wet weather or when moistened curl down so that the points meet or are in-rolled beneath the center of the fruit body. Sometimes an inner part of the wall remains as a cup around the lower part of the spore chamber. Outer surface of the wall dark brown, usually splitting or cracking longitudinally. When fresh the exposed part of the recurved rays is pale brown and smooth or concentrically cracked. In groups on the ground in woods, often around old stumps.

Genus *LYCOPERDON*

Key to Species of *Lycoperdon*

1. Growing on stumps and logs, usually in clumps,
surface at first covered with scattered
spines - - *L. pyriforme*
Growing on the ground, surface at first densely
spiny - - 2
2. Tips of numerous spines united with each other
- - 3
Tips of spines not united - - 4
3. Spore mass at maturity olive brown, spines 1-1.5
mm. long - - *L. peckii*
Spore mass dark purple brown, spines 2-5 mm.
long - - *L. pulcherrimum*
4. Spines minute, of uniform size - - *L. umbrinum*
Spines of various sizes intermixed with warts
- - *L. gemmatum*

Description of Species of Lycoperdon

1. *LYCOPERDON GEMMATUM*. Edible. Fruit body with a spherical or rounded top, tapering gradually or sharply to a definite, stalklike base, 3-6 cm. wide, 4-7 cm. high, surface first white, later brown, top at first densely covered with a mixture of numerous short spines and warts and less numerous long spines which are smaller toward the base of the plant. The longer spines usually are shed at maturity, leaving characteristic smooth patches on the top of the fruit body; the short spines usually persist. Spore mass at maturity yellowish olive brown or dark brown with a purple tinge. Singly or scattered on the ground or on very rotten wood.
2. *LYCOPERDON PECKII*. Edible. Fruit body with an almost spherical head 2-4 cm. in diameter and a tapering base 1-2 cm. long, surface covered with fine white tapering spines 1-1.5 mm. long, the tips of adjacent spines united. At maturity the spines become tan to brown and fall off, leaving a smooth brown inner wall. The spore mass is first white, then greenish yellow, finally olive brown. On the ground in woods.
3. *LYCOPERDON PULCHERRIMUM*. Edible. Fruit body spherical or with a tapering stalklike base, 2-5 cm. in diameter, surface first densely covered with tapering spines up to 8 mm. long, the tips of which are united, white when young, later pale tan. When the fruit bodies are mature this coating of spines is shed from the rounded upper part, exposing the smooth, shiny, brown or purple brown wall of the spore chamber. Spores at maturity olive brown or dark purple brown. Almost mature plants, when broken, have a distinct aromatic odor. Usually solitary, on the ground in woods and fields.

4. *LYCOPERDON PYRIFORME*. Edible. Fruit body pear shape, with a rounded top and tapering stem, 2-4 cm. wide, 3-5 cm. high, surface white when young, later tan, then dark grayish brown, at first covered with very short spines and warts which later disappear. Spore mass dark olive brown at maturity. White strands of mycelium extend from the base of the fruit bodies into the decaying wood on which they grow. Usually in dense clumps on decaying wood and at the base of decaying trees.

5. *LYCOPERDON UMBRINUM*. Fruit body with a globose or flattened top that tapers rather abruptly to the stem, 2-4 cm. wide, 3-5 cm. high, stem 1-2 cm. long, surface of top covered with spines 1-2 mm. long that first are white and later become brown. Spore mass at maturity golden brown or dark brown, rarely with a tinge of purple. Solitary or scattered on the ground in woods.

FAMILY SCLERODERMATACEAE

Only a single genus and species is here considered, *Scleroderma vulgare*. Fruit bodies spherical, 2-5 cm. in diameter, at first white, later brown, the wall thick and leathery. The interior is first white, very firm and hard, and when young the numerous spore producing chambers are definitely outlined; at maturity the interior is filled with a mass of purple black spores; there is no regular opening, the fungus apparently depending on insects or animals to distribute the spores. Often the fruit bodies are at first formed just beneath the surface of the soil, and become visible only as they enlarge. The fruit body is attached to the soil by a rather dense tuft of coarse mycelium. There are several closely related species of *Scleroderma*, some of which are said to be poisonous. The present species

is found most frequently under oaks, and may be rather common in lawns where oak trees grow.

FAMILY SECOTIACEAE

This family contains a single genus, *Secotium*, of which there is only a single species, *Secotium agaricoides*. Fruit body irregularly conical or somewhat heart shaped, 3-6 cm. in diameter at the base, 4-10 cm. high, surface at first silky white toward maturity becoming pale tan, the outer layer breaking up to form rectangular, concentrically arranged, flat scales that gradually disappear toward the top. The wall is 2-3 mm. thick and rather firm. Stem short and pointed, terminating in a strand of mycelium 2-3 mm. thick. The stem extends up through the interior of the fruit body and is continuous with the outer wall at the top; stem 6-12 mm. in diameter near the top, larger toward the base, soft and fibrous. At maturity the wall splits away from the stem at the base, thus allowing the spores to fall out. The spores mass at first is white, later becomes yellow and finally dark yellowish brown. The spore chamber contains many plate-like walls that are most apparent when the plants are mature. Odor of ripe specimens rather sweet and pleasant. Usually in groups or dense clumps in pastures. At least one of the older mushroom books states that this fungus is suspected of being poisonous, but one of the writer's correspondents who had sent in a number of them for identification stated, "If they are poisonous we have all been dead for 6 weeks." They had been eating them in quantity for some time, and from this evidence it seems likely that the species is edible.

FAMILY NIDULARIACEAE

Key to the Genera of Nidulariaceae

1. Fruit body cup shaped, or cylindrical with a rounded base - - *Crucibulum vulgare*
 Fruit body narrowed toward the base, the top flaring, like the mouth of a trumpet
 - - *Cyathus*

Genus CRUCIBULUM

CRUCIBULUM VULGARE. Fruit body cupshaped or almost cylindrical with a rounded base, 8-12 mm. high, 4-8 mm. wide, outer surface at first covered with velvety, light brown hair, later glabrous or nearly so, pale brown or gray. The top at first covered with velvety, light brown hair, later glabrous or nearly so, pale brown or gray. The top at first is rounded and as this expands a hairy, pale brown membrane is exposed, which covers the spore masses. This membrane soon ruptures and exposes another, very delicate, white membrane which also soon breaks and disappears. The inner wall of the cup is smooth, sometimes shiny, pale silvery gray. Spore chambers 1-2 mm. across, at first white, later often brown. Usually scattered or in fairly dense groups on rotten wood, twigs, or plant debris, rarely on the dead outer bark of living trees.

Key to Species of *Cyathus*

1. Interior of the fruit body longitudinally striate - - *C. striatus*
 Interior not striate, outer wall covered with coarse hair when specimens are young, later it becomes almost smooth
 - - *C. stercoreus* and *C. vernicosus*

Description of Species of *Cyathus*

1. *CYATHUS STERCOREUS* AND *CYATHUS VERNICOSUS*.

Fruit body shaped like an inverted cone with a flaring mouth, 5-12 mm. high, 4-8 mm. wide at the top, tapering down to a narrow stalk, outer surface tan or grayish brown and covered with coarse hair when young, almost black and sometimes glabrous when old, inner surface pale or dark gray, smooth, top at first rounded and closed, expanding to expose a delicate membrane stretched across the opening; this membrane soon breaks, exposing a cluster of black, flattened spore balls, most of which are attached to the base of the cup by an elastic strand of mycelium, although some may be quite loose. In groups, often of several dozen to several hundred specimens, on manured ground, plant debris and rotten wood. The two species here described together can be separated with certainty only by the use of microscopic characters.

2. *CYATHUS STRIATUS*. Fruit body shaped like an inverted, flaring cone, 8-16 mm. high, 6-10 mm. wide at the top, narrowed at the base to a stem. Outer surface brown or blackish brown, at first covered with coarse hair, later glabrous; inner surface gray to dark grayish brown, with distinct, regular striations running downward from the mouth. Spore chambers 1.5-2 mm. in diameter, round, flattened, grayish brown, each one attached to the base of the cup by an elastic strand of mycelium that, when moist, will stretch for several centimeters. The young plant, like that of the species described above, has a rounded top that, as it expands, exposes a white membrane covering the spore balls. Auxiliary spores, conidia, are formed on the surface of this membrane and dispersed by the wind before the membrane breaks and disappears. Scattered or in groups on twigs, plant debris and wood.

FAMILY PHALLACEAE - STINK HORNS

The stink horns and some closely related fungi produce spherical or oval eggshaped structures beneath the surface of the soil; the plant develops within this structure, protected from drying out and from injury by the thick outer wall of the "egg" and a thick layer of gelatinous material just inside the wall. When the spores are almost mature, the stem elongates rapidly, rupturing the tough wall of the egg, and the cap, covered with a mass of gooey, ill smelling material in which the spores are borne, is raised up into the air. The evil odor of the material in which the spores are imbedded is very attractive to some kinds of flies, especially those associated with carrion. These flies wallow about in this material, and presumably carry the spores to places where the fungus can survive and grow.

Key to the Family Phallaceae

1. Spores borne on the narrowed tip of the stalk,
not on a special cap like structure
- - *Mutinus revenelii*
Spores borne on a definite cap like structure
at the top of the stalk - - 2
2. A flaring, pendulous, netted veil extending below the edge of the cap
- - *Dictyophora duplicata*
Veil not extending below the edge of the cap
- - 3
3. Surface of the cap chambered
- - *Ithyphallus impudicus*
Surface of cap smooth or granular
- - *Ithyphallus revenelii*

Description of Species of Phallaceae

1. *Dictyophora duplicata*. Stalk 10-15 cm. long,
3-4 cm. thick, cylindrical or nearly so, tapering at the tip and the base, white, hollow and with an opening at the tip into the hollow; cap conical to almost globose, 3-5 cm. high, surface of the cap covered with angular, shallow, thinwalled chambers each 4-6 mm. in diameter, covered with olive brown, very evil smelling slime, joined to the top of the stem by a rounded collar. A netlike veil is attached to the tip of the stalk beneath the cap and hangs down against the stem or flares out below the lower edge of the cap for 3-4 cm. Solitary or more often in groups above decaying roots of trees.
2. *Ithyphallus impudicus*. Stalk 10-15 cm. long,
2-3 cm. in diameter, white, brittle, hollow, tapering almost to a point at both the upper and lower ends, cap attached to the tip and hanging down about 3 cm., the surface with conspicuous polygonal chambers from 4-10 mm. in diameter. Spore mass dark olive brown and very evil smelling. The species is distinguished from *Dictyophora duppicata* by its lack of a veil beneath the cap, and from *Ithyphallus ravenelii* by the chambered surface of the cap.
3. *Ithyphallus ravenelii*. Stalk 10-15 cm. long,
2-3 cm. in diameter, white, brittle, hollow, composed of several layers of chambers, tapering at the tip and base, the cap conical, 2-3 cm. long, surface of the cap rough but not chambered. Spore mass dark olive brown and evil smelling. A thin veil is present beneath the cap but does not extend beyond the lower margin of the cap. Solitary or scattered above decaying wood and rotten roots of trees, common in lawns and gardens, occasional on sawdust piles. This stinkhorn

sometimes is so abundant in lawns and gardens as to constitute a minor nuisance, especially to those who think that everything strange is to be feared.

TREMELLALES

JELLY FUNGI

This group of fungi were so named because some of them, when moist, have a consistency suggesting jelly, although it frequently is a decidedly tough jelly. Most of them grow on wood and only one of them, so far as is known, is good to eat. They are taken up in detail in "Revision of the North Central Tremellales" by G. W. Martin, University of Iowa Studies in Natural History Vol. 19, No. 3, 1952; available from the Dept. of Publications, University of Iowa, Iowa City.

Key to Tremellales

1. Fruit body black, tough-gelatinous, irregularly convoluted, 1-2 cm. in diameter
 - - *Exidia glandulosa*
 - Fruit body pear-shaped, tough, 3-5 cm. wide, common on old logs - - *Hirneola auricula-judae*
 - Fruit body yellow, very gelatinous, translucent, 1-5 cm. in diameter, hemispherical or irregular - - *Tremella lutescens*
 - Fruit body white, gelatinous, 1-5 cm. in diameter, hemispherical or irregular
 - - *Tremella albida*

Description of Species of Tremellales

1. *CALOCERA CORNEA*. Fruit bodies consisting of upright unbranched or rarely branched stalks, each 8-15 mm. high, 2-4 mm. thick, golden yellow, hard and brittle when dry, firm gel-

atinous when moist. In groups or clusters on the bark or wood of fallen trees.

2. *EXIDIA GLANDULOSA*. Fruit body 1-2 cm. wide, irregularly circular in outline, lying flat on the surface of branches or trunks of fallen trees, convex above, the surface convoluted with narrow ridges, jet black, shrinking to a flat membrane when dry. Usually in groups on hardwoods.

3. *HIRNEOLA AURICULA-JUDAE*. Edible. Fruit body 3-7 cm. wide, almost flat or shallow cup shape or like an ear, the surface often with several rounded ridges, tan to brown, hard and leathery when dry, flexible when moist. On branches and trunks of fallen trees, often in groups.

4. *TREMELLA LUTESCENS*. Fruit bodies 1-3 cm. wide, irregularly hemispherical, convoluted, translucent golden yellow when fresh and moist, paler when old. Solitary or scattered on branches and trunks of dead trees.

ASCOMYCETES

CUP FUNGI AND RELATIVES

There are a considerable number of genera of fleshy Ascomycetes, and some of these contain a large number of species, of which only the more common are included here. For a more detailed account of these fungi the reader is referred to the two books by F. J. Seaver, "The North American Cup Fungi", one volume dealing with the "Operculates" and the other with the "Inoperculates".

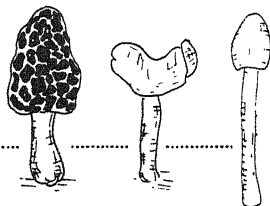
Keys to Families, Genera, and Species of Ascomycetes

1. Fruit bodies fleshy or leathery - - 2
 Fruit bodies hard and woody, solid, black when
 mature, growing on the branches, trunks, or
 roots or living or recently dead trees - - 4

2. Fruit body cup or disc
 shaped, stalked or
 sessile - - Pezizaceae



- Fruit body bell or saddle
 shaped or conical, stem
 distinct from the cap
 - - Helvellaceae



- Fruit body spatulate - - 3

3. Entire fruit body black

- - *Geoglossum*



Top of fruit body yellow, stem

tan or white - - *Spathularia*



4. Fruit bodies stalked, slender,

finger like - - *Xylaria*

polymorpha (on wood)



Cordyceps (on insects).....



5. Fruit bodies hemispherical, the interior

divided into concentric

zones, on dead trees and wood

- - *Daldinia concentrica*

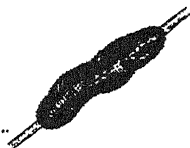


Fruit bodies irregular, on the

branches of living cherries

and plums

- - *Dibotryon morbosum*.....



Genera of the Family Helvellaceae

1. Surface of the pileus with prom-

inent irregular ridges that

give a sponge like appearance

to the cap - - *Morchella*



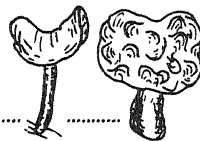
Surface of the pileus smooth or

with slight convolutions

- - *Verpa*



Pileus saddle shaped or irregularly globose, smooth or convoluted - - *Helvella*



Descriptions of Genera and Species of Ascomycetes

MISCELLANEOUS ASCOMYCETES

1. **CORDYCEPS.** Fruit bodies various colors, but the common species bright orange red, 3-5 cm. high, up to 5 mm. in diameter near the top, club shape with a tapering stem, the entire surface of the club covered with pimple like projections, which are the snouts of the cavities in which the spores are borne and from which the spores are forcibly expelled. Singly or in clumps of 2 to 5, arising from insects in ground or decayed wood.
2. **DALDINIA CONCENTRICA.** Fruit body hemispherical to almost spherical, 1-4 cm. in diameter, first brown, later black, the interior composed of a series of concentric zones and very brittle in texture. Solitary or scattered on decaying wood. Fruit bodies of this fungus taken into the laboratory and kept in a moderately humid air will discharge its black spores in quantity, usually only at night, every night for a week or more.
3. **DIBOTRYON MORBOSUM.** Fruit body surrounding the twigs of *Prunus*, black, up to 20 cm. long, 1-2 cm. thick, first brown, later black, the interior brittle.
4. **GEOGLOSSUM.** Fruit body consisting of a stem 2-4 cm. long, 2-4 mm. thick, and a flattened oval head pointed or rounded at the top, black, flexible and rather tough in texture. In groups on decaying stumps of trees.

5. *LEOTIA LUBRICA*. Cap irregularly hemispherical, translucent yellow or yellowish green, surface covered with wartlike humps, 2-12 mm. wide, sticky or slimy; stem 2-5 cm. long, 2-5 mm. thick, cylindrical, hollow, continuous with and colored like the cap. In dense clumps of up to 50 or more specimens on the ground or on very rotten wood.
6. *SPATHULARIA FLAVIDA*. Fruit body shaped somewhat like a broad tipped, narrow handled spatula, cap rather fan shaped, 2-3 cm. wide, 3-5 mm. thick, yellow and fleshy; stem white or tan, 2-3 cm. long, 3-6 mm. thick, solid. Usually in groups under conifer trees.
7. *XYLARIA POLYMORPHA*. Fruit body with an irregularly cylindrical or fingerlike head that tapers gradually into a stem, the head 4-8 cm. long, 0.5-2 cm. thick, often flattened, grayish and somewhat fleshy when young, soon woody and black, the surface roughened by the tips of the spores producing cavities which can be easily seen if the surface is cut off with a sharp knife. Stem 4-8 cm. long, 5-10 mm. thick, tapering downward, sometimes branched. Usually in groups of several on decaying wood.

Genus *HELVELLA*

Key to Species of *Helvella*

1. Stem ridged - - 2
Stem even or pitted - - 3
2. Cap and stem white or pale tan - - *H. crispa*
Cap dark brown, stem paler - - *H. mitra*

3. Stem 1 cm. or more in diameter, surface of cap very much convoluted - - *H. infula*
Stem not over 7 mm. in diameter, surface of cap smooth or nearly so - - 4
4. Cap and stem black - - *H. atra*
Cap tan to black, stem paler - - *H. elastica*

Description of Species of *Helvella*

1. *HELVELLA ATRA*. Cap irregularly saddle shape, surface even, black or nearly so, margin lobed, under surface dark brown. Stem 3-5 cm. long, 3-4 mm. thick, whitish at the base, otherwise black, enlarged at the base. Solitary or scattered on the ground in woods.
2. *HELVELLA CRISPA*. Cup saddle shape, smooth or irregularly wrinkled and lobed 2-5 cm. wide, white or pale tan, margin entirely free. Stem 3-6 cm. long, 1-2 cm. thick, with prominent branched ridges, straight or slightly curved. Usually in groups of 2-6 on moist ground in woods.
3. *HELVELLA ELASTICA*. Cap irregularly saddle shape surface even, brown to black margin free from the stem, sometimes lobed. Stem 4-8 cm. long, 3-7 mm. thick, tan, smooth. Scattered or solitary on the ground in woods.
4. *HELVELLA INFULA*. Cap 5-10 cm. wide, irregularly spherical or somewhat saddle shaped, very much convoluted, reddish brown or dark brown. Stem 4-8 cm. long, 2-4 cm. thick, white or tan, pitted by not ridged, hollow except at the base, very brittle and fragile. Solitary or scattered on the ground in woods. Seaver, in "North American Cup Fungi (Operculates)" considers *Gyromitra esculenta* merely a form of this species; by many it is thought to be a very desirable edible

fungus, but it also has been responsible for some cases of fatal poisoning, and therefore should not be eaten.

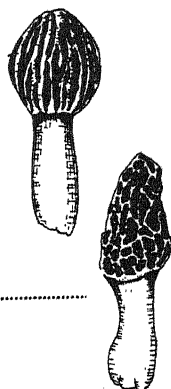
5. *HELVELLA MITRA*. Cap irregularly saddle shape and convoluted, 2-5 cm. wide, dark brown, margin usually curved in and attached to the stem in several places. Stem 5-10 cm. long, 1-2 cm. thick, with prominent twisted and branched ridges, tan or brown. Scattered on the ground in woods.

Genus MORCHELLA

All of the species of this genus are edible and many consider them to be the choicest of the edible wild fungi. Attempts have been made to cultivate them, so far without success - the mycelium grows very readily in culture, but fruit bodies are not produced.

Key to Species of Morchella

1. Margin of the cap free from the stem - - *M. hybrida*
 Margin of the cap attached to the stem - - 2
2. Ribs of cap thin, pits large and shallow, stem considerably enlarged at the base - - *M. crassipes*
 Ribs thick, pits small and deep, stem slightly or not at all enlarged - - 3



3. Cap subglobose or cylindrical,
with a rounded top
- - *M. esculenta*
Cap conical, with a pointed
top - - *M. conica*



Description of Species of Morchella

1. **MORCHELLA CONICA.** Edible. Cap more or less conical in shape, 4-8 cm. high, 2-4 cm. wide at the base, ridges and pits often extending longitudinally, at least more so than those of *Morchella esculenta*, which it most resembles. Stem 4-8 cm. long, 1-3 cm. thick, white, cylindrical, hollow, brittle. Scattered on the ground in woods. This species grades into *Morchella esculenta* and some authors consider it to be only a variety of that species.
2. **MORCHELLA CRASSIPES.** Edible. Cap irregularly cylindrical or narrow conical, 5-8 cm. high, 3-5 cm. wide at the base, tan or pale brown, ribs irregularly branched, narrow, pits large and shallow. Stem 5-10 cm. long, 2-3 cm. thick at the top, enlarged at the base, white or pale tan, hollow, brittle. Scattered on the ground in woods.
3. **MORCHELLA ESCULENTA.** Edible. Cap almost spherical to irregularly oval, usually rounded at the top, not pointed as are those of the other species, 4-8 cm. high, 3-5 cm. wide at the base, ridges irregularly branched, pits rounded or irregular, 5-10 mm. wide, 5-10 mm. deep, tan or brown. Stem 4-8 cm. long, 1-3 cm. thick, white, hollow, fragile. Scattered on the ground in woods, grassy places and orchards.

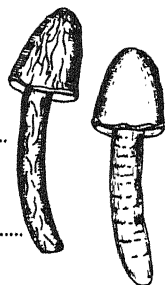
4. *MORCHELLA HYBRIDA*. Edible. Cap bell shape or almost spherical, 2-3 cm. vertically and horizontally, with longitudinal, branched ridges, tan, margin of cap free from the stem. Stem 4-10 cm. long, 1-2 cm. thick, white, hollow, brittle, often enlarged at the base, attached to the inside of the cap half way up from the margin to the top. Scattered on the ground in woods.

Genus *VERPA*

Key to Species of *Verpa*

1. Cap with shallow vertical ribs
 - - *V. bohemica*

Cap smooth or pitted
 - - *V. conica*



Description of Species of *Verpa*

1. *VERPA BOHEMICA*. Edible. Cap 2-3 cm. long, 1-2 cm. wide, free from the stem, tan or brown, conical or almost cylindrical, margin slightly flaring and wavy, surface with low branched ridges and shallow, irregular furrows, inside of cap white. Stem 4-8 cm. long, 10-15 mm. thick, white, smooth, cylindrical, hollow or filled with loose mycelium. Scattered on the ground in woods.

2. *VERPA CONICA*. Edible. Cap 1.5-2.5 cm. high, 1-2 cm. wide, cylindrical with a rounded top or conical, tan to brown, at first smooth, soon with delicate netlike ridges, the underside of the cap white, margin often flaring

slightly and upturned to show the white under side. Stem 4-6 cm. long, 10-15 mm. thick, cylindrical, smooth or with scales arranged in partial circles around it. Scattered on the ground in woods.

FAMILY PEZIZACEAE

Key to the Genera of the Family Pezizaceae

1. Outer wall of fruit body thick and gelatinous
- - *Bulgaria inquinans*
Outer wall leathery or brittle, thin - - 2
2. Outer wall hairy - - 3
Outer wall glabrous - - *Peziza*
3. Fruit body deep cup shaped, tapering to a stalk
at the base - - 4
Fruit body usually disc like, without a stalk
- - 6
4. Growing attached to branches and twigs on the
ground - - 5
Growing on the ground, tan or
brown in color - - *Paxina*
5. Inner surface red, outer sur-
face white and hairy
- - *Sarcoscypha coccinea*
Entire fruit body dark brown
- - *Urnula craterium*
6. Outer surface white, hairy - - *Aleuria aurantia*
Outer surface dark brown, hairy - - *Patella*



ALEURIA AND BULGARIA

1. *ALEURIA AURANTIA*. Fruit body at first spherical, then becoming saucer shape, irregular in outline when old and often distorted by mutual pressure of adjacent specimens when many grow together, each fruit body 1-5 cm. wide, outer surface nearly white, covered with fine hair, inner surface bright orange when fresh, fading to pale yellowish orange. Usually in clusters on the ground in woods, fields, and lawns. Seaver, in "North American Cup Fungi (Operculates)" states, "- - it is one of the commonest and most widely distributed of the larger cup fungi, occurring from the Atlantic to the Pacific and probably throughout temperate North America as well as abroad."

2. *BULGARIA INQUINANS*. Fruit body at first cup shape, later almost flat, 2-3 cm. in diameter, jet black, the outer wall 2-4 mm. thick, tough and elastic, gelatinous when moist, thinner and pliable when dry, attached to the bark on which it grows by a short stemlike base. When placed in a moist chamber it will deposit an abundance of spores that are black in mass. With only casual examination it could easily be confused with a jelly fungus. On the bark of living trees and on partially decayed wood.

Genus PATELLA

Key to Species of Patella

1. Inner surface white to brown - - *Patella albida*
Inner surface red - - *P. scutellata*

Description of Species of Patella

1. *PATELLA ALBIDA*. Fruit body at first spherical, later deep or shallow cup shape, 1-3 cm. wide, 5-15 mm. deep, circular or irregular in outline, outer surface brown and covered with bristlelike hairs up to half a mm. long that form a fringe at the margin, inner surface at first white or nearly so, later becoming pale tan. Usually in groups on the ground or on very rotten wood.
2. *PATELLA SCUTELLATA*. Fruit body globose when young, soon flat with an upturned margin, 3-10 mm. wide, upper surface bright orange red when fresh, fading to pale red or yellowish red when old, lower surface dark brown, covered with bristly hairs that reach a length of 1 mm. on the margin and form a visible fringe. Commonly in groups on very decayed wood.

Genus PAXINA

Key to Species of Paxina

1. Outside of fruit body veined
- - *P. acetabulum*
Outside not veined - - 2
2. Stem 3-4 cm. long, slender
- - *P. hispida*
Stem not over 1 cm. long, thick
- - *P. semitosta*



Description of Species of Paxina

1. *PAXINA ACETABULUM*. Fruit body cup shape, 2-5 cm. wide, the cup 1-3 cm. deep, outer surface grayish tan or brown, with prominent, branching, connected ribs that arise from ridges on the stem and become smaller toward the margin of the cup, delicately hairy; inner surface brown or blackish brown; stem 1-4 cm. long, 1-2 cm. thick, with large, irregular ridges, colored like the outside of the cap. Solitary or a few together on the ground in woods and open places.
2. *PAXINA HISPIDA*. Fruit body cup shape, 2-3 cm. wide, 8-12 mm. deep, regular in outline, outer surface grayish brown and densely covered with short hairs, inner surface brown; stem 2-5 cm. long, 2-4 mm. thick at the top, tapering upward slightly, smooth or faintly ridged, pubescent, colored like the outside of the cap, solid and somewhat flexible. Solitary or scattered on the ground or on very rotten wood in the forest.
3. *PAXINA SEMITOSTA*. Fruit bodies 2-5 cm. wide, 2-5 cm. high, deep cup shape and tapering gradually to a thick stem, larger below the top than at the top itself, margin incurved, irregular; outer surface brown, delicately hairy, inner surface pale tan when young and fresh, brown when old, stem up to 1 cm. long, 1-2 cm. thick, ridged, hairy, colored like the outside of the cap, partly or entirely submerged. In groups on the ground and on rotten wood.

Genus PEZIZA

Key to Species of Peziza

1. Inner surface of fruit bodies violet
 - - *P. violacea*
 Inner surface tan to brown - - 2
2. Fruit body nearly flat at maturity - - *P. repanda*
 Fruit body cup shaped at maturity - - 3
3. Outer surface rough or coarsely granular near
 the base - - *P. vesiculosa*
 Outer surface smooth - - *P. badia*

Description of Species of Peziza

1. PEZIZA BADIA. Fruit body at first nearly spherical, later cup shape with incurved margin or flattened and the margin irregularly circular in outline, 3-6 cm. in diameter, outer surface pale tan or white when young, later brown, smooth, inner surface dark brown. Usually several specimens grow together so closely that they are somewhat distorted by mutual pressure. On the ground in woods.
2. PEZIZA REPANDA. Fruit body 3-12 cm. wide, first cup shape, later nearly flat, margin irregularly circular, notched or lobed; outer surface pale tan or white, inner surface pale brown when young, darker when old, stem 2-3 cm. long or lacking. Usually in groups on decaying wood, sometimes on the ground.
3. PEZIZA VESICULOSA. Fruit body 2-6 cm. wide, irregularly cup shape, usually much contorted from mutual pressure, sessile or tapering to a stemlike base, margin wavy and often

split, outer surface white or gray, coarsely roughened or granular toward the base, inner surface pale translucent brown. In clumps on manure piles, recently manured ground, compost heaps and sometimes on soil.

4. PEZIZA VIOLACEA. Fruit body 2-5 cm. wide, cup shape or nearly flat, margin irregularly lobed and split, outer surface almost white when young, pale violet when old, inner surface at first pale violet, later deep violet brown. Scattered or in groups on the ground, especially in areas recently burned over.

5. SARCOSCYPHA COCCINEA. Fruit body cup shape, 1-2 cm. wide, with a stem 1-3 cm. long and 3-5 mm. thick, outside of cup and stem covered with white woolly hair, inner surface of cup bright scarlet. In groups and colonies on decaying twigs on the ground.

6. URNULA CRATERIUM. Fruit body 2-4 cm. wide, 3-6 cm. deep, dark brown or almost black, spherical when young, later irregularly cup shape, the margin notched or lobed; outer surface of cup densely covered with short black hair, wall pliable but breaking rather easily; inner surface brown. The cup tapers to a stem 1-4 cm. long, 4-8 mm. thick, black, covered with woolly black mycelium at the base. In clumps of several on the ground.

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GLOSSARY

- ABORTIVE - - imperfectly formed
- ACUTE - - tapering to a very narrow or sharp edge
- ADNATE - - gills joined to the stem their entire width
- AGARIC - - any gill fungus
- ANASTOMOSING - - branching so as to form a network
- ANNULUS - - the ring around the stem of a mushroom that is formed by the broken veil
- APPLANATE - - flat (see plate 8, page 149)
- APPRESSED - - flat, not raised
- AZONATE - - without zones
- CAESPITOSE - - in dense bunches or tufts
- CAMPANULATE - - (see plate 7, page 7)
- CARTILAGINOUS - - resembling cartilage in texture, rather tough and stringy
- CONCENTRIC - - successive circles of increasing size around a common center
- CONTEXT - - that portion of the fruit body above the pores or gills
- CONVOLUTE - - with irregular, curved furrows
- CRENULATE - - with tiny scallops
- DAEDALOID - - pores that are very irregular in shape (see plate 9, page 150)
- DECURRENT - - gills that run down the stem
- DECURVED - - curved downward
- DENTATE - - edge irregular, suggesting teeth
- DICHOTOMOUS - - forked into two branches
- ECCENTRIC - - attached off center
- ECHINULATE - - covered with minute spines
- EFFUSED REFLEXED - - partly flat on the surface, partly shelving (see plate 9, page 150)
- FARINACEOUS - - an odor resembling that of freshly crushed wheat
- FIMBRIATE - - fringed
- FLOCCOSE - - covered with coarse woolly hairs

- FREE - - gills that do not touch the stem
GLABROUS - - naked, not covered with hair
GRANULAR - - slightly rough, covered with tiny grains
GREGARIOUS - - numerous individuals near each other,
but not in tufts
HYGROSCOPIC - - taking up water
IMBRICATE - - overlapping, something like shingles
on a roof (see plate 9, page 150)
INTERVENOSE - - with veins between, said of gills
having, on their sides, branched ridges that re-
semble veins
INVOLUTE - - rolled inward
LATERAL - - stem attached at one side of the cap
LOBED - - having rounded divisions on the margin
LONGITUDINAL - - lengthwise
OBTUSE - - rounded, not tapering to a sharp edge
PELLICLE - - the cuticle or thin skin forming the
surface of a mushroom cap
PILEUS - - the cap of a mushroom; the entire fruit
body of any stalkless fleshy fungus
POROID - - resembling pores
PUBESCENT - - covered with fine hairs
RECURVED - - curved upward and inward
RENIFORM - - shaped like a kidney bean
RETICULATE - - covered with a network of raised
ridges
SECEDING - - gills that at first are attached to
the stem but separate from it later

SEPARABLE - - easily removed
SERRATE - - with pointed teeth, like the edge of a
saw
SESSILE - - without a stem, shelf-like
SHEATH - - a membrane of mycelium enclosing the stem
of a mushroom
SINUATE - - gills notched at the stem (see plate 7,
page 7)
SPATHULATE - - shaped like the blade of a spatula
STRIATE - - marked with tiny streaks, furrows or
lines

- STRIATIONS - - delicate lines or furrows
- UMBILICATE - - a small depression in the center of
the cap
- UMBONATE - - having a raised portion in the center
of the cap
- UNDULATE - - wavy
- UNGULATE - - hoof shaped (see plate 8, page 149)
- VOLVA - - the cup shaped structure surrounding the
base of the stem of some mushrooms

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